the OIL AND GAS JOURNAL

"In View of PERFORMANCES... accept my order for another FRANKS MFG. CORP. Trailer Rig"

H. V. MIDDLETON, INC.
WORK OVER RIGS
P. O. BOX 4708
OKLAHOMA CITY, OKLAHOMA
October 25, 1951

Franks Manufacturing Corp.,
Tulsa, Oklahoma.

Gentlemen:

In June, 1951, delivery was made by your company to H. V. Middleton, Inc., of a Franks Trailer Rig. This rig has been in continuous operation since date of the delivery with no down time for repairs or maintenance.

During July and August, 1951, a series of work-over operations were performed on wells in the Elmore Unitized Area, Garvin County, Oklahoma, for a major oil company. We submit a resume of these operations which may be of interest to you, as follows:

Number of wells..... 7

Work performed:
Moved in, rigged up, mixed mud, killed wells, displaced, pulled packers, cleaned out to T.D., scraped casing, set packers, displaced, swabbed wells in, and tore down..... 40 Days, 15 hrs.

Total time, 7 wells..... 5 3/4 days

Average time per well.....

Trucking:
Average distance of each move..... 1 1/2 miles
Average cost for each move per well $208.00

In view of these and other performances by this equipment, you may now accept my order for the delivery of another Franks Trailer Rig at the earliest possible moment.

Yours very truly,
H. V. MIDDLETON, INC.
By H. V. Middleton
Pres.

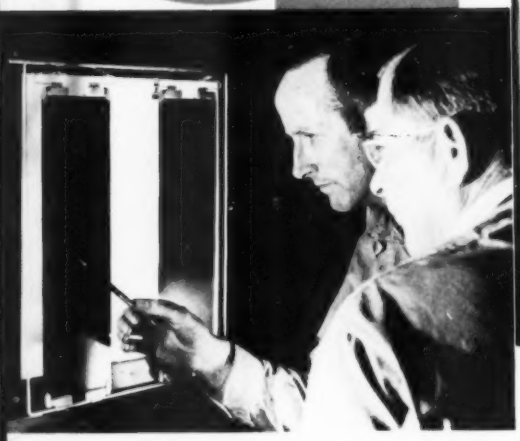
rite for details or see a nks representative. There's model to fit your needs.

FRANKS MFG. CORP.
WELL SERVICING AND DRILLING UNITS
TULSA, OKLAHOMA

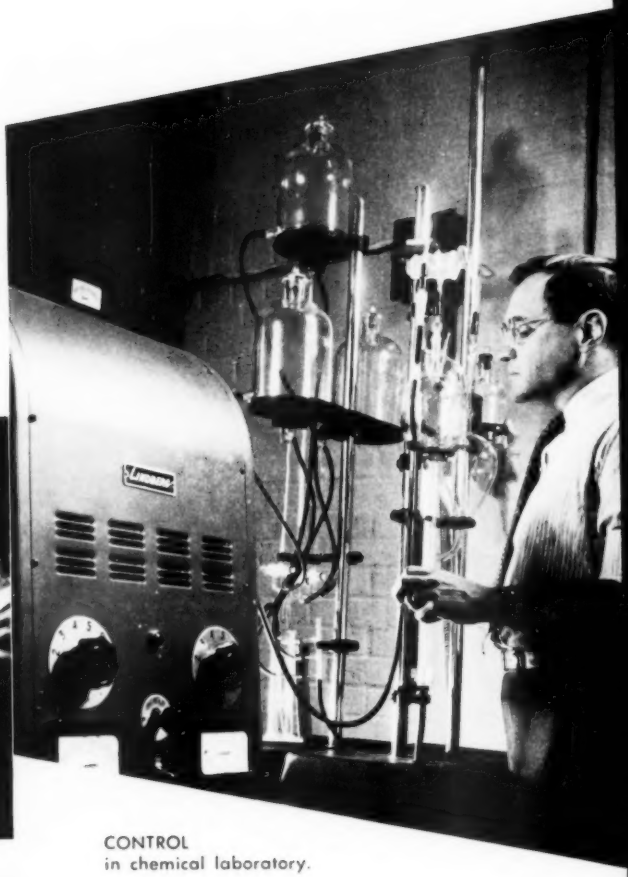
PRICE 50 CENTS TABLE OF CONTENTS PAGE 57 NOVEMBER 29, 1951

QUALITY CONTROL

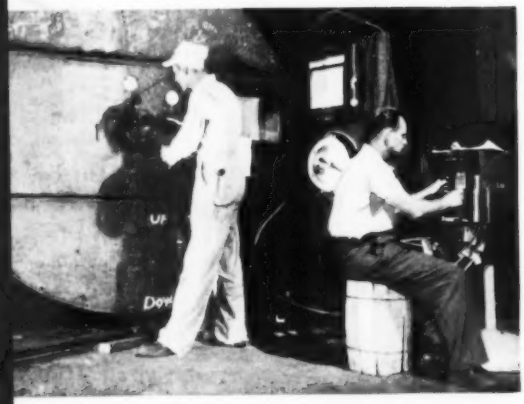
At Wyatt's
no phase of fabrication
in its minutest detail
is left to chance.



X-ray film examination.



CONTROL
in chemical laboratory.



Stress relieving by inducting air
heated to high temperatures.

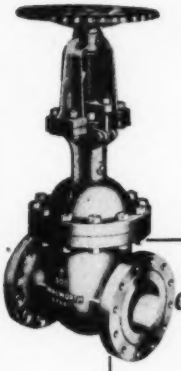
Wyatt's
HOUSTON-DALLAS-NEW YORK-TULSA

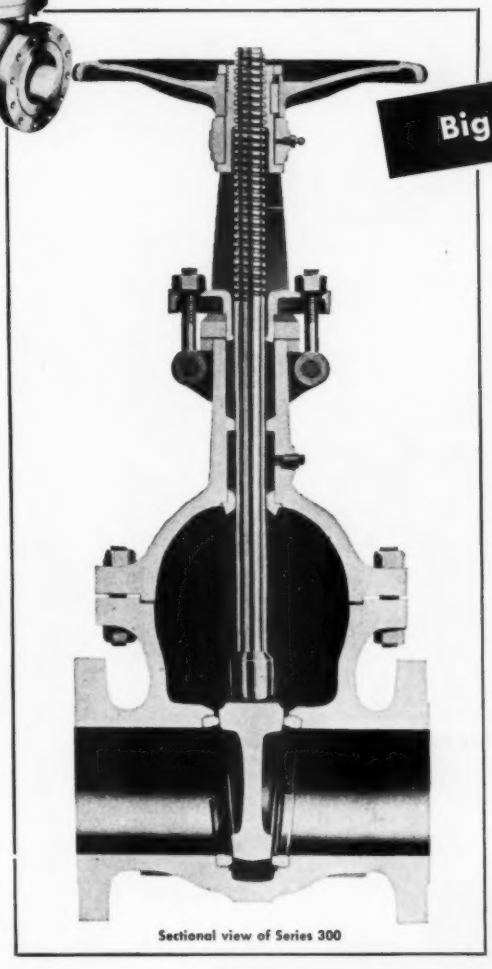
WALWORTH

Cast Steel Gate Valves

Series 150 and 300

Wedge Gate — Outside Screw and Yoke





Sectional view of Series 300

Big 8-Point Superiority!

Gland clearances are such that stem cannot be scored if gland should be tightened unevenly.

Deep Stuffing Boxes in all sizes (2″ to 24″) insure tightness and maximum packing life – costly leaks are eliminated.

Bonnets and Bodies are engineered to withstand pressure and minimize distortion – they're tough, durable, dependable.

Heavy Steel Walls provide extra strength and longer life.

Integral Body Guide Rib Faces are machined to insure accurate disc seating.

Seat Rings are bottom seated – not flange type. No recess exists at back of ring – hence no turbulence, erosion, or pressure drop.

Streamlined Ports allow high velocity, non-turbulent flow, and reduce the possibility of erosion.

Valves regularly have flanged ends. They can be supplied with ends for butt welding. Roller bearing yokes are available. On valves 5 inches and larger, by-passes can be furnished.

For Series 600 and higher, we recommend Walworth Pressure-Seal Steel Gate Valves.

For further information on Walworth Cast Steel Gate Valves, see your local Walworth distributor, or write:

WALWORTH

valves and fittings

60 EAST 42nd STREET, NEW YORK 17, N. Y.

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

The Oil and Gas Journal, published Thursdays by The Petroleum Publishing Company. Entered as second-class matter September 1, 1910, at post office at Tulsa, Okla., under act of March 3, 1879. U. S. and foreign rates to the petroleum industry, $3 yearly. Copyright 1951.

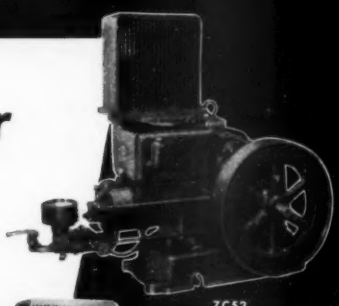
You can Pick the Power to fit the Pump

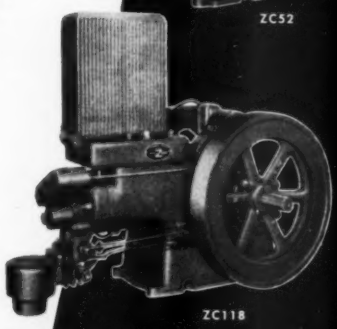
with the "ZC"

Because the Fairbanks-Morse line of "ZC" Engines is so broad, you can pick the size that will best fit your pumping requirements . . . from 3 to 30 hp.

Fairbanks-Morse "ZC" Engines are high displacement, slow-speed, heavy-duty models . . . the ideal type for oil field pumping service. They are economical to operate and maintain . . . simply designed to eliminate need for complicated parts and delicate adjustments. And, *all* have the famous extra heavy, double flywheels that assure smooth, efficient performance . . . with the drive on either side of the engine.

For all the facts, see your local supply store or write Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago 5, Ill.


ZC52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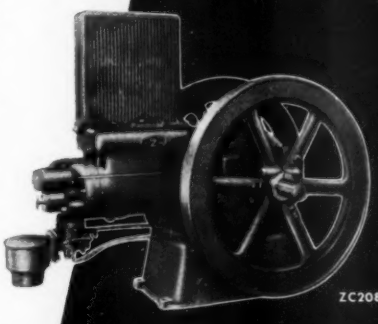
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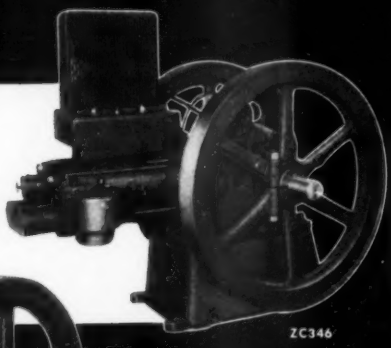
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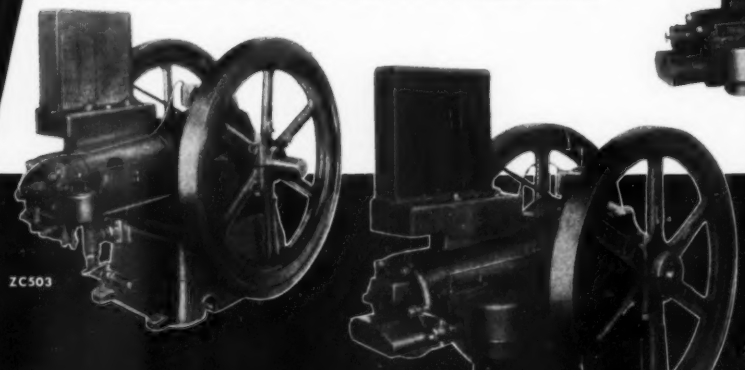
ZC503

ZC739

FAIRBANKS-MORSE,

a name worth remembering

OIL FIELD EQUIPMENT • PUMPS • SCALES • ELECTRIC MOTORS • GENERATORS • LIGHT PLANTS • DIESEL, DUAL FUEL AND GASOLINE ENGINES • MAGNETOS • DIESEL LOCOMOTIVES

Great **AMERICANS**

Reduce Maintenance Time with
AMERICAN PUMPING UNITS

Longer service with less servicing. That's the record of American Pumping Units . . . many in the field for 15 years and longer. Write for Catalog 151. Contact your favorite supply store or the nearest American office.

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Houston, Texas, 320 West Bldg., Ph. Ch. 4-3301
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FORT WORTH 1, TEXAS PHONE VALLEY 2301

On Either Standard or Jackknife Rigs

YOU GET MORE ROUND TRIPS

with

Tuffy®

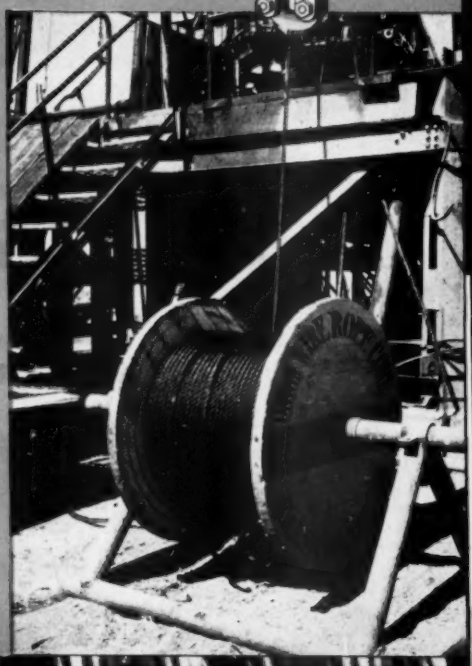
ROTARY LINE

This is not merely a manufacturer's claim. It is backed up by field tests of Tuffy Rotary Line on both standard and jackknife rigs. To make these tests, Union Engineers worked closely with drillers in the field.

The Tuffy Rotary Line is made of special steels and employs a unique construction. It has higher resistance to abrasion, shock loads, drum crushing and internal friction. These are the things that cause early rope fatigue.

On jackknife rigs, Tuffy ***Jackknife*** Rotary Line spools and reeves better and operates at higher speeds over the smaller sheaves and drums of the jackknife rig.

Tuffy ***Standard*** Rotary Line is designed for use with a standard rotary rig. It will give you maximum performance and more round trips. It is also easy to cut, when necessary, and spools well. For deeper drilling with jackknife rigs, Tuffy ***Standard*** Rotary Line is recommended.



Easy To Order

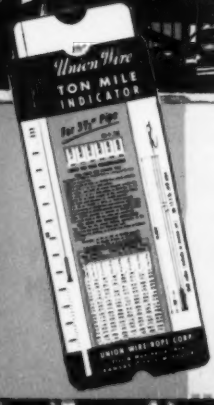
When you order Tuffy Rotary Line, you do not have to remember complicated specifications. Just give size, length and whether Tuffy **Jackknife** or Tuffy **Standard**.

Lower Wire Rope Costs By Measuring The Work Your Drilling Line Does

Now Union gives drillers a way to measure the drilling line service for the purpose of establishing the correct time for line cutting. When you know this, you can prevent cutting the line too soon or over-loading, either of which lowers ton mileage. And it will aid you in avoiding more line breaks and costly fishing operations. By measuring ton-mileage, you can make a much better showing in drilling performance.

Mail This Coupon To Have Your Ton-Mile Indicator Delivered To You

A Union field representative will bring you your free ton-mile indicator and show you how easy it is to use. He will also give you a handy Union Log Book. The indicator does all the complicated figuring for you. Merely set the figures from your log book on the indicator and read the answer. Mail the coupon today.



union Wire Rope

UNION WIRE ROPE CORPORATION

2102 Manchester Ave. Kansas City 3, Mo.

Gentlemen: Please have a Union field representative deliver my Union Ton-Mile Indicator and Log Book and explain its use.

Name_____

Address_____

City_____ Zone____ State_____

For distinguished service...

PHILLIPS PETROLEUM COMPANY is proud to receive the 1951 Chemical Engineering Achievement Award for having:—

"... contributed most to the advance of chemical engineering in industry..."

Seventy of the nation's leading chemical engineering authorities independently voted this honor to Phillips for a two-fold achievement: First, Phillips development of high abrasion carbon black; second, Phillips major contribution to the success of cold synthetic rubber. Together these advances make possible automobile tires that wear thousands of miles longer than the finest tires ever made before.

Credit for this success goes to those who make chemical dreams come true in our laboratories and plants. Over 2,000 of our nearly 20,000 employees are scientists and engineers. From their diversified efforts come achievements without number across the whole broad field of petroleum chemistry.

We work vigorously with nitrogen fertilizers, atomic energy, sulfur compounds, synthetic fiber materials and many organic chemicals. And, of course, we are in our third decade as large producers, refiners and marketers of fuels and lubricants.

Previously this award has recognized such great endeavors as the Atomic Bomb Project and the war-time Synthetic Rubber Industry.

AN AWARD
FOR
CHEMICAL ENGINEERING
ACHIEVEMENT
TO
PHILLIPS PETROLEUM COMPANY
IN RECOGNITION OF ITS MERITORIOUS CONTRIBUTION TO THE ADVANCE OF THE INDUSTRY AND PROFESSION, MADE POSSIBLE THROUGH A BROADER PARTICIPATION BY THE CHEMICAL ENGINEER IN THE AFFAIRS OF THE PROCESS INDUSTRIES
PRESENTED BY
CHEMICAL ENGINEERING
NOVEMBER 28, 1951

It is a privilege for us to be honored with these groups and with the other important chemical companies which have also earned this high distinction for outstanding chemical engineering accomplishments.

WHAT THIS ACHIEVEMENT MEANS TO YOU...

For every 9,000 miles you drive your car, the average wear is about 1/8th of an inch from the tread of natural rubber tires made with ordinary carbon black.

Now, with tires made with *Philblack O* high abrasion carbon black* and *cold rubber*, the same 1/8th inch of tread wear will give you 12,000 . . . 13,000 . . . even 14,000 miles of good, safe service.

*A Trademark

Phillips 66

PHILLIPS PETROLEUM COMPANY

Phillips Chemical Company, a subsidiary

Bartlesville, Oklahoma

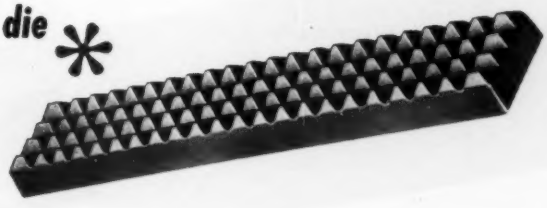
Be on guard

Not all tong dies with pointed teeth are

WEB WILSON THE ORIGINAL PYRAMID TOOTH TONG DIES

Here's the genuine Tiger Tooth die *

Fast-moving crews *know* they grip instantly—won't slip—and last lots longer. ★ Be sure you get the box with the yellow and black "Tiger Stripes"—the *best* dies ever made.



YOUR SUPPLY STORE HAS ALL SIZES OF— "Tiger Tooth" TONG DIES

BE SAFE • BE SMART • BE ECONOMICAL

WEB WILSON Oil Tools — FIELD PROVEN

BOX 96, LOS ANGELES 2, CALIFORNIA

BE KIND TO RESERVOIRS WEEK

You can never be too understanding of an oil and gas producing formation if you expect it to remain your best friend throughout its productive life.

Each particular reservoir is born with its own unique maximum recovery characteristics, ie., its ability to relinquish maximum high-gravity yield at minimum pressure decline. Therefore, to maintain an optimum recovery program you must learn, *early in the life of the field*, how much of the oil which you have discovered is really *recoverable* oil; how many of those recoverable reservoir barrels can be actually counted today as tomorrow's *stock tank barrels;* and by what mechanical procedures you can establish an ultimately successful production program.

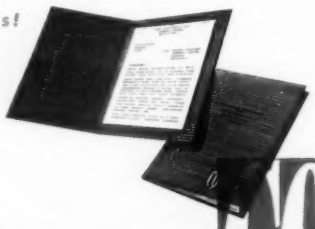
No standard rules exist which fit perfectly any two producing operations. Each horizon must be studied individually, *before pressure decline can alter basic productive characteristics.*

Even at that, there's nothing complicated about it. Immediately after the completion of a key well, simply ask Core Lab to take a sample of the reservoir fluid and develope a comprehensive Reservoir Fluid Analysis Report. This vital information, combined with other formation data, then becomes your own specific "maximum reservoir revenue formula" —*good for the life of the field!*

The cost? A drop in the bucket, as compared to the increase in recoverable oil.

If it's worth producing,
it's worth producing RIGHT!

Ask your Core Lab man today
about Reservoir Fluid Analysis!



CORE LABORATORIES, INC. ● **IN ALL ACTIVE AREAS**

Dallas, Houston, Corpus Christi, Midland, Abilene, San Antonio, Tyler, Wichita Falls, Lubbock, and Post, Texas; Oklahoma City, Oklahoma; Great Bend, Kansas; Shreveport, Lafayette and New Orleans, Louisiana; Natchez, Mississippi; Bakersfield, California; Denver, Colorado; Worland, Wyoming; El Dorado, Arkansas; Farmington, New Mexico; Calgary and Edmonton, Canada; Venezuela, S. A.

CORE LAB

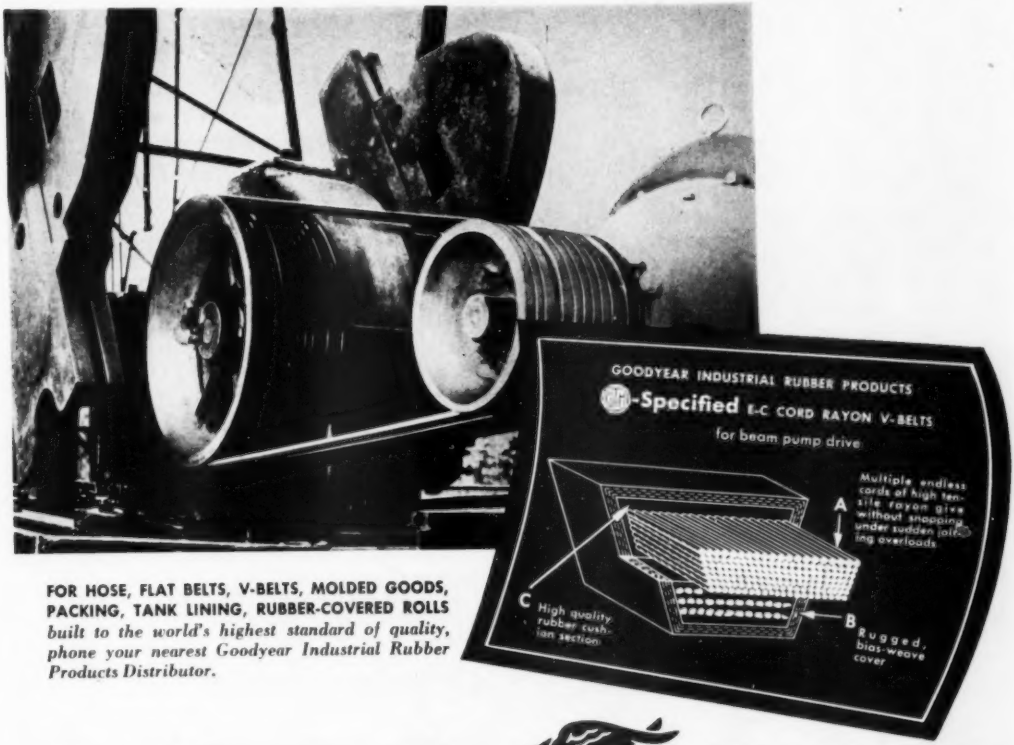
PETROLEUM RESERVOIR ENGINEERING

TRIPLE SERVICE

on this tough beam pump oil field drive

ORDINARY V-belts failed after 373 days, due to high overload and open-air operation in all kinds of weather.

G.T.M.—Goodyear Technical Man—specified E-C Cord V-belts bodied with multiple cords of high-tensile rayon in the load-carrying section. Belts served 1200 days—three-times-plus the service of competitive belts on this particularly rough drive—*and double the average V-belt service for similar units in this southwest field.*


GOODYEAR INDUSTRIAL RUBBER PRODUCTS
-Specified E-C CORD RAYON V-BELTS
for beam pump drive
Multiple endless cords of high tensile rayon give without snapping under sudden jolting overloads
A
B Rugged, bias-weave cover
C High quality rubber cushion section

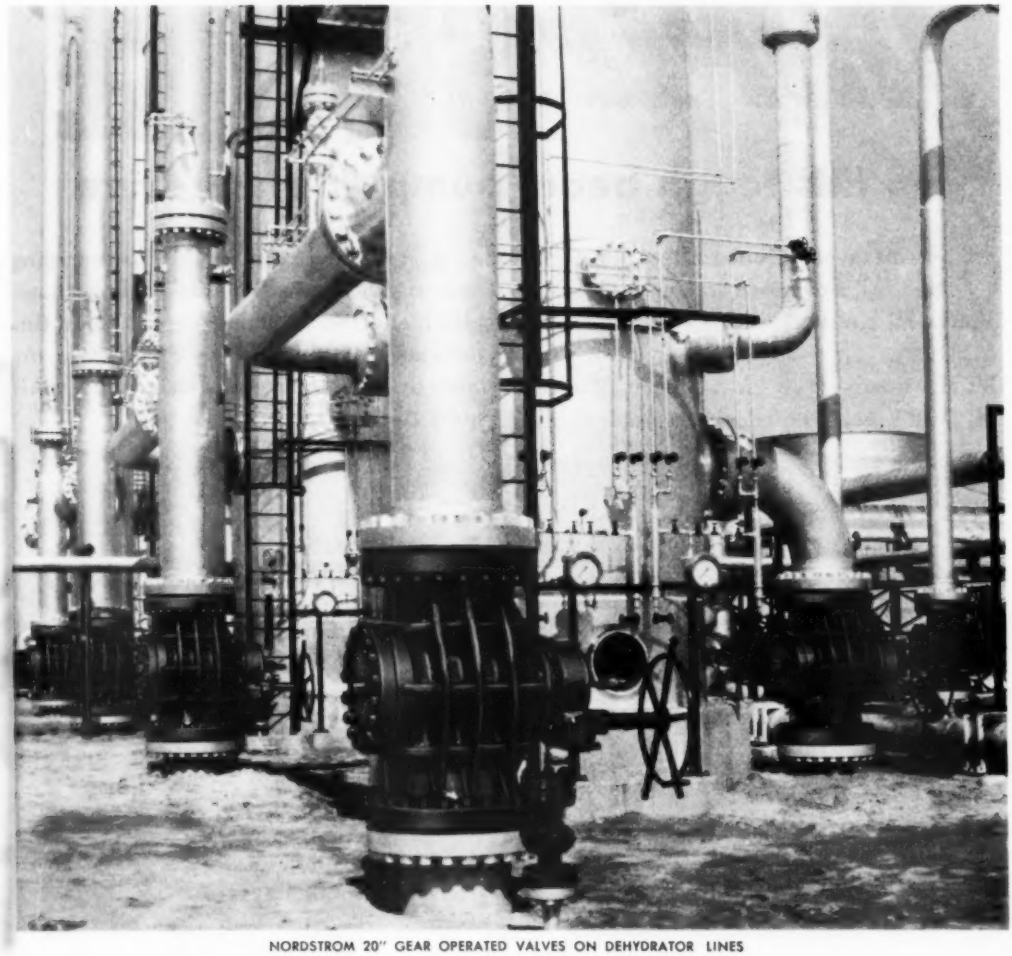
FOR HOSE, FLAT BELTS, V-BELTS, MOLDED GOODS, PACKING, TANK LINING, RUBBER-COVERED ROLLS *built to the world's highest standard of quality, phone your nearest Goodyear Industrial Rubber Products Distributor.*

GOODYEAR

THE GREATEST NAME IN RUBBER

We think you'll like "THE GREATEST STORY EVER TOLD"—Every Sunday—ABC Network

E-C Cord—T.M. The Goodyear Tire & Rubber Company, Akron, Ohio



NORDSTROM 20" GEAR OPERATED VALVES ON DEHYDRATOR LINES

When you visit a fine plant, what valves do you see?

Nordstrom Valves

ROCKWELL MANUFACTURING COMPANY 400 North Lexington Avenue, Pittsburgh 8, Pa.

"WHAT A TRAVELING BLOCK!"

"Mon, O' Mon,
Did You Say 300 TONS?"

Something New
Has Been Added!

NEW
300 Tons rated capacity

NEW
Double row, pre-adjusted, Timken bearings, mounted on 8" diameter shaft.

NEW
Johns-Manville "klipper" grease seals, self adjusting, positively retain lubricant.

NEW
E-Z opening guards for quick stringing up.

NEW
42" diameter alloy steel flame hardened sheaves, 9000 streamlined pounds for fast falls and quicker round trips.

Write for catalog of this and other McKissick Products.

McKISSICK BUILDS A BETTER BLOCK
FOR EVERY PURPOSE

McKISSICK PRODUCTS CORPORATION
Box 2496 Tulsa, Oklahoma

McKISSICK

FISHER® Offers You The and Complete Line

TYPE 57T

Diaphragm motor valve equipped with Fisher Positrol valve positioner.

Features:

1. **Large superstructure for power to overcome friction losses.**
2. **Fisher Teflon V-Ring Packing requires no lubrication.**
3. **Wall sections and boltings conform with ASA code.**
4. **Yoke mounting boss for valve positioner.**
5. **Quality controlled materials and workmanship.**

TYPE 530

High rangeability diaphragm control valve for small flows and high pressure drops commonly encountered in experimental and pilot plant operations.

TYPE 567

Reverse action topwork, generally used with push-down-to-close valves which must be spring closed in action.

TYPE 790R

Pressure balanced diaphragm control valve — either single or double diaphragm construction — for use with remote mounted instrument or pressure loader.

TYPE 57T-D

High pressure diaphragm control valve. Available in small sizes for 3,000 lbs. and 6,000 lbs. working pressure.

FISHER TEFLON V-RING PACKING

- No gland leakage.
- Used on wide range of pressures without appreciable change in friction values.
- Elimination of maintenance and adjustment.
- No valve stem lubricators required.
- Chemically inert to all fluids up to 450° F.

FISHER LEADS THE INDUSTRY

Industry's Most Versatile of Diaphragm Motor Valves

Illustrated here are just a few of the complete line of Fisher Governor Company diaphragm motor valves. They are manufactured to handle pressure conditions up to 10,000 pounds, for high pressure drops, for handling contaminated fluids (coke, sludge, slurry). Available in metals for highly corrosive service and alloys for high temperature work. They are built for your specific requirements with a wide choice of inner valves to provide desired flow characteristics.

TYPE 57T-DA

High pressure diaphragm control valve. Available in small sizes for 3,000 lbs. and 6,000 lbs. working pressures with angle body.

TYPE 5700

Springless type diaphragm motor valve, double diaphragm actuated. Power actuator suitable for up to 5,000 lbs. unbalanced thrust.

TYPE 1657S

Three-way diaphragm motor valve with single disc, double seat, commonly used on flow diversion work.

TYPE 57T-K

Diaphragm motor valve with fully balanced inner valve with soft seat for tight closure.

TYPE 510S

Diaphragm motor valve with small single seated bronze body.

TYPE 461-462

Diaphragm motor valve with Sweep-Flo angle body and continuous connected handwheel diaphragm motor operator.

TYPE 7700

Diaphragm motor valve with butterfly valve construction for handling large volumes under low pressure drop conditions.

TYPE 581

Diaphragm motor valve, single seated, piston balanced with internal pilot.

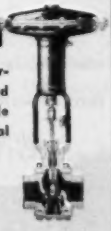
TYPE 57T-L

Single seated, flapper check for low pressure drop installations such as meter runs.

TYPE 1657T

Three-way valve, double port, double disc, full throttling.

TYPE 57Q



Diaphragm operated single seated body, reversible without additional parts.

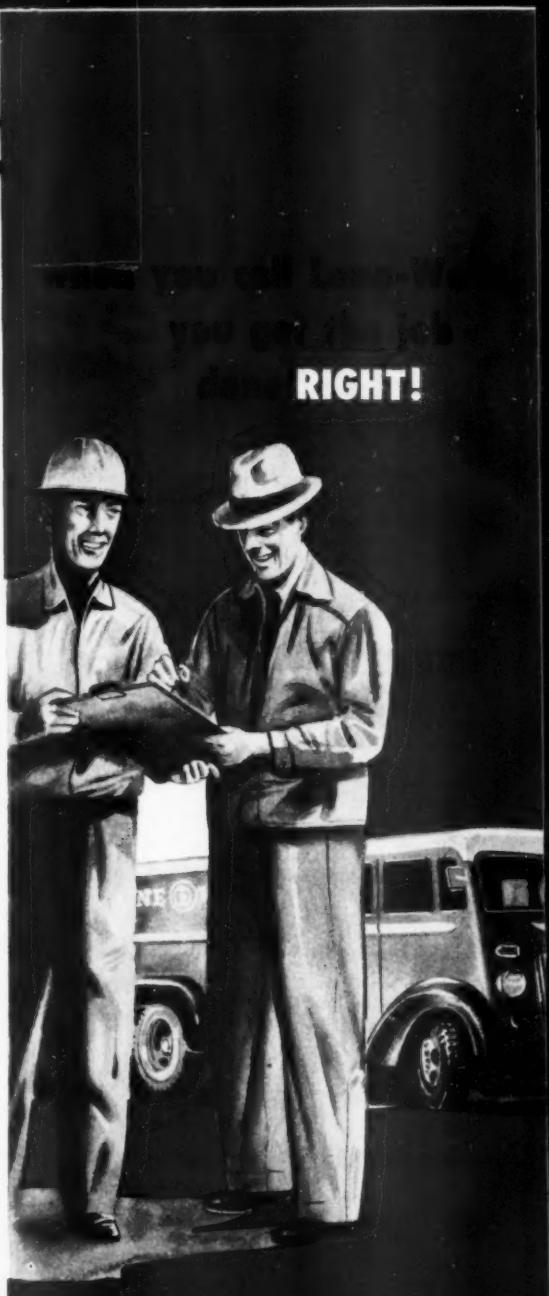
TYPE 57T

Standard diaphragm motor valve, available with variety of inner valve constructions.

FISHER GOVERNOR COMPANY, Marshalltown, Iowa

IN RESEARCH FOR BETTER PRESSURE CONTROL

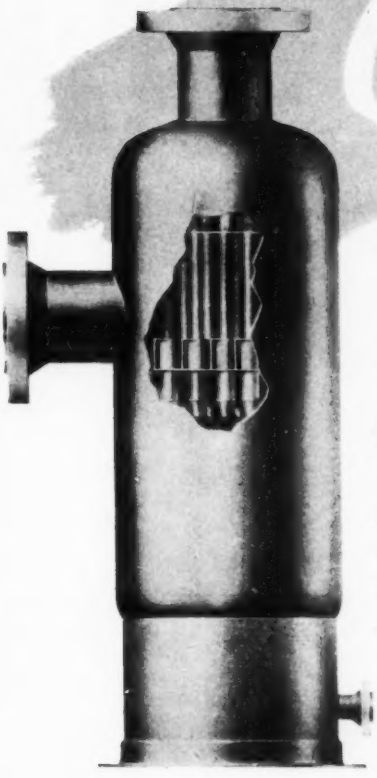
Experience proves it!



Many hundreds of successful operators can testify that when the Lane-Wells truck rolls up to the rig, you have everything right there to do your perforating *right!* Up-to-the-minute equipment, engineered to fit the needs of *your* job . . . accurate depth measuring devices to put the shots exactly where you order them — and an operating crew that knows your well conditions, your problems. That thoroughly trained Lane-Wells crew plays a big part in a good perforating job. Carefully chosen men, well trained and thoroughly experienced, they get on the job quickly, rig up fast and complete the job in the shortest time consistent with accuracy and safety. That experienced team work saves unnecessary down time. Call Lane-Wells on your next perforating job; when the truck rolls away afterwards, you'll agree that experience gets the job done RIGHT!

LANE WELLS

Better Perforating



Clean

DRY GAS

in secondary distribution systems

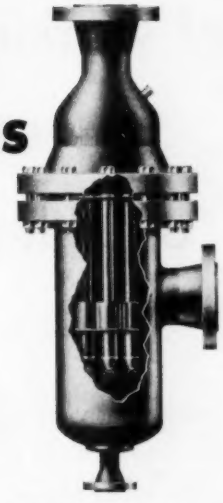
with AEROTEC

GAS SCRUBBERS

Multiple cyclone tubes of small diameter, assembled in the pressure shell, separate impurities from the gas with high efficiency.

LARGE VERTICAL TYPE

SMALL VERTICAL TYPE



Gas in your distribution lines stays clean and free-flowing with Aerotec Dry Gas Scrubbers on the job. These units apply the principle of centrifuging to remove entrained dusts, liquids, and distillates from the gas. It is a *dry* cleaning process. There is no oil or other filtering medium to carry over into the gas stream. Aerotec also eliminates other difficulties normally experienced with conventional types of scrubbers.

Simple in design and lightweight, Aerotec Dry Gas Scrubbers are available in sizes and capacities to meet all requirements of local distribution systems. Leading utilities such as Consolidated Edison Co., Manufacturers Light & Heat Co., Rochester Light & Heat Co., and many others use Aerotec units in scores of locations with outstanding results.

A Thermix Project Engineer is near you and will be glad to supply technical data and assistance in choosing Aerotec Dry Gas Scrubbers to fit your specific needs. Call or write.

Project Engineers **THE THERMIX CORPORATION** Greenwich, Conn.

(Offices in 28 Principal Cities)

Canadian Affiliates T. C. CHOWN, LTD., Montreal 25, Quebec; Toronto 3, Ontario

Manufacturers

THE AEROTEC CORPORATION

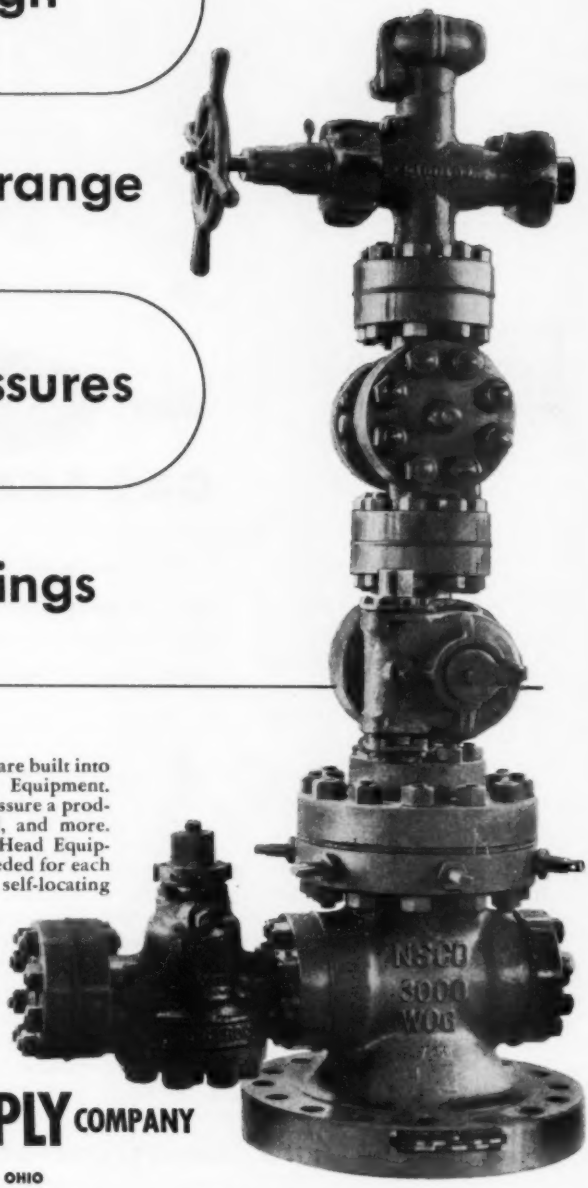
GREENWICH, CONN.

flexible design

for complete range

of working pressures

and depth ratings



Safety, dependability and interchangeability are built into the "National Blue" line of Well Head Equipment. Precision machining, gauging, and testing assure a product that always gives the service required, and more.

The design flexibility of National Well Head Equipment provides the size, capacity and type needed for each individual well. Assembly is simplified by self-locating parts which are self-activating. Advanced hydraulic testing methods insure sound seals.

National's Well Head Equipment is available in the complete range of working pressures and depth ratings. Get the facts from your National Supply Representative.

THE NATIONAL SUPPLY COMPANY

GENERAL SALES OFFICES: TOLEDO, OHIO

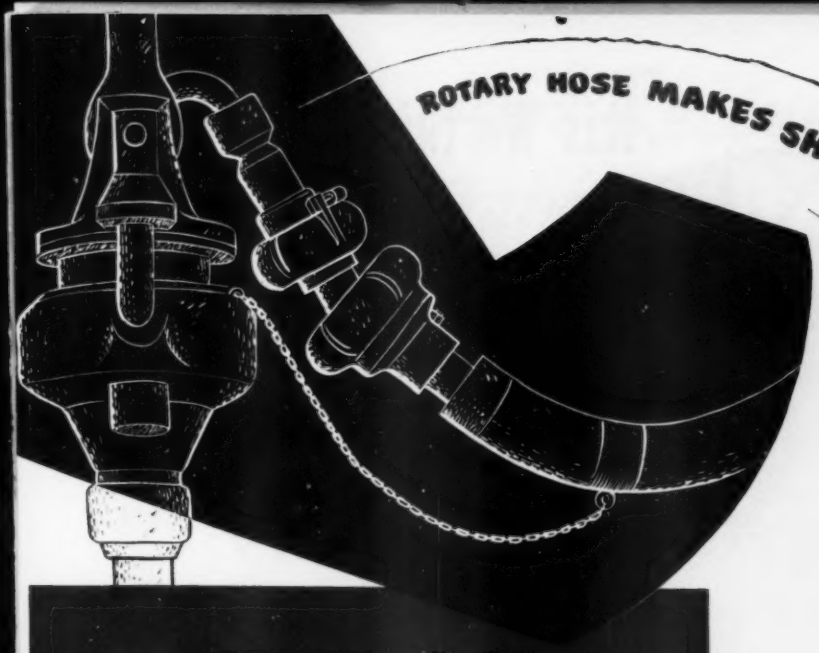
DIVISION OFFICES: Casper; Ft. Worth; Houston; Pittsburgh; Tulsa; Torrance

CANADA: The National Supply Company, Limited, 702 Barron Building, 610 Eighth Avenue, West, Calgary, Alberta

EXPORT: National Supply Export Corporation, 600 Fifth Avenue, New York 20, N.Y., U.S.A.; River Plate House, 12 South Place, London, E.C. 2

NATIONAL BLUE PRODUCTS

NATIONAL OIL FIELD MACHINERY & EQUIPMENT • SPANG STEEL PIPE • SUPERIOR & ATLAS ENGINES

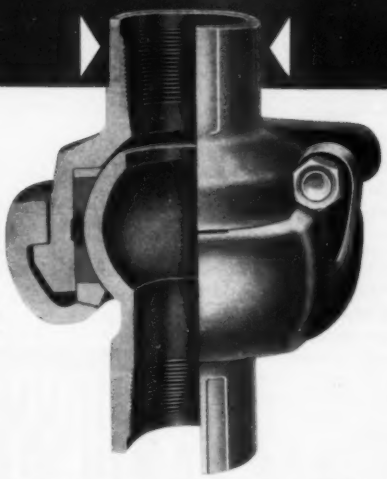


ROTARY HOSE MAKES SHARP BENDS, TOO . . . .

UNIBOLT FLEXI-BALL JOINTS

Relieve the Strain

IT SWIVELS . . . an advantage when making up in a manifold.



IT FLEXES . . . relieving lines of stress due to vibration or misalignment.

Relieving rotary hose of damaging strains is one of several popular applications of UNIBOLT Flexi-Ball Joints. They are equally desirable in mud manifolds to facilitate making up misaligned connections and to keep them free of stress; on steam lines to protect them against contraction and expansion; on any line subject to intermittent vibration and pulsation.

A feature which distinguishes the Flexi-Ball Joint from all others is the use of the UNIBOLT Coupling principle, rather than threaded connections, to connect the ball and socket members. Release only one bolt to break the joint. ***There are no threads to gall and freeze.*** It may be used safely in any service since it is made in steel only. Sizes from 1½" to 6"; test pressures to 6,000 lbs., 500 lbs. steam working pressure.

THORNHILL-CRAVER CO.

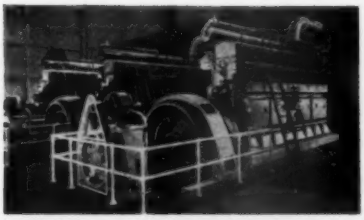
HOUSTON, TEXAS

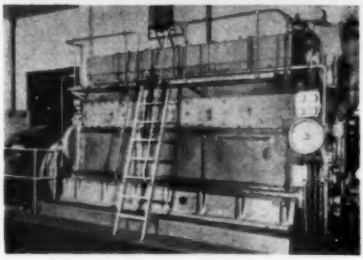
this Worthington diesel...

(shown during erection)

for the first diesel driven hot oil pump in the world

Ross exchanger equipped!





On this 450 hp Worthington diesel driving a sextuplex hot oil pump — the first of its kind in the world — a Ross lubricating oil cooler has been installed as a factory component.

Likewise, on numerous other Worthington diesels (two are shown), Ross Exchangers are being given the lube oil cooling assignment.

The wide use of Ross Exchangers in the diesel industry today is not anything that happened over night. It is a trend that began many years ago. And then, as now, just a few simple reasons have made the big difference:

The Ross reputation for proved dependability; complete standardization of design, of sizes, of component parts that so greatly simplify engineering; diversification of standard types to cover most conditions; prompt service from the factory on engineering problems and deliveries.

These reasons are important to you too, in the solution of your heat transfer problems. Give us an opportunity to apply them to your needs.

ROSS HEATER & MFG. CO., INC.

Division of American Radiator & Standard Sanitary Corporation

1417 West Avenue Buffalo 13, N. Y.

In Canada, Horton Steel Works, Limited, Fort Erie, Ont.

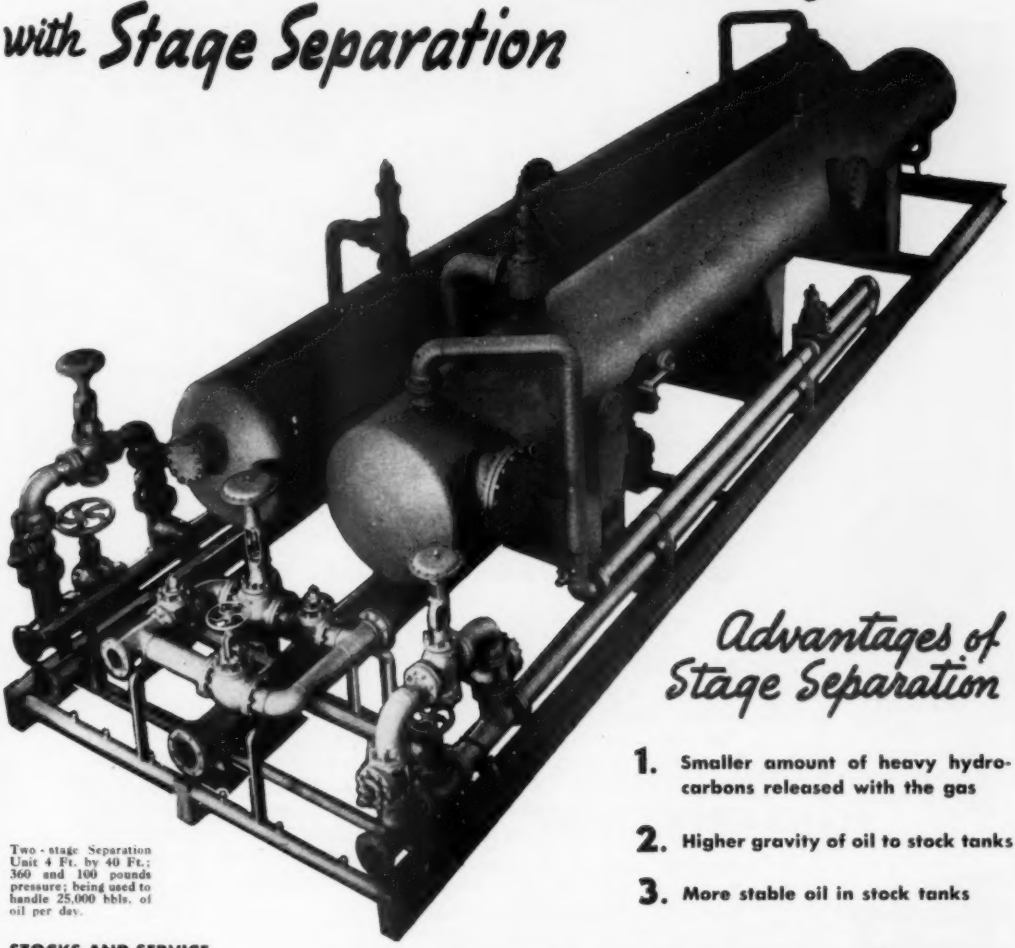
ROSS

EXCHANGERS

Serving home and industry

AMERICAN STANDARD · AMERICAN BLOWER · ACME CABINETS · CHURCH SEATS · DETROIT LUBRICATOR · KEWANEE BOILERS · ROSS HEATER · TONAWANDA IRON

More Efficient Recovery with Stage Separation



Two - stage Separation Unit 4 Ft. by 40 Ft.; 360 and 100 pounds pressure; being used to handle 25,000 bbls. of oil per day.

Advantages of Stage Separation

1. **Smaller amount of heavy hydrocarbons released with the gas**
2. **Higher gravity of oil to stock tanks**
3. **More stable oil in stock tanks**

STOCKS AND SERVICE LOCATIONS

Artesia, N. M.; Corpus Christi, Tex.; Dallas, Tex.; Edmonton, Canada; Farmington, N. M.; Fort Worth, Tex.; Houston, Tex.; Lafayette, La.; Midland, Tex.; New Orleans, La.; Odessa, Tex.; Oklahoma City, Okla.; Pampa, Tex.; San Angelo, Tex.; Snyder, Tex.; Tulsa, Okla.; Wichita Falls, Tex.

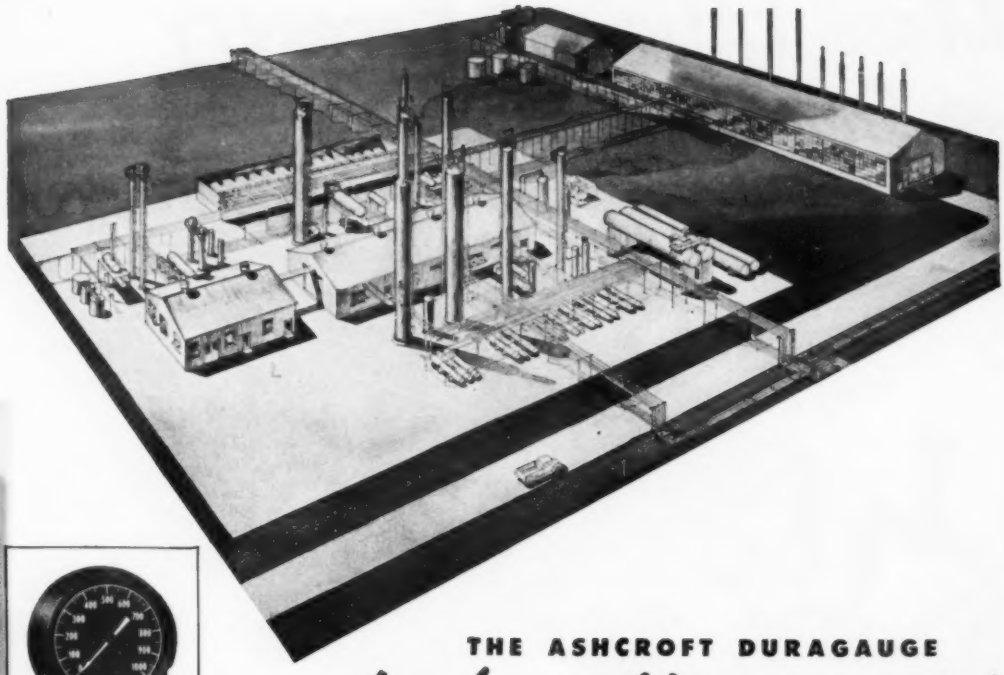
Maloney-Crawford packaged, skid-mounted stage separator units offer all the advantages of two stage separation plus the additional benefits of being completely shop assembled and skid mounted. They can be furnished with or without a by-pass arrangement whereby the individual separators may be by-passed, if desired. Tying in with field lines is only connection work required. Completely portable they may be used either for permanent or test installations. Variety of combinations in working pressures available.

MALONEY CRAWFORD

MALONEY-CRAWFORD TANK & MFG. CO.

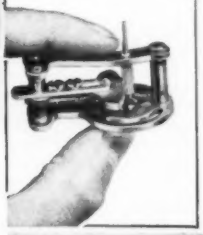
PETROLEUM EQUIPMENT SUPPLIERS ASSOCIATION MEMBER

FACTORY AND GENERAL OFFICE: 38 NORTH PEORIA—BOX 659—TULSA, OKLAHOMA
EXPORT REPRESENTATIVE: Baird Lines, 420 Lexington Avenue, New York, N. Y.
CANADIAN REPRESENTATIVE: Maloney-Crawford of Canada, Ltd., Edmonton, Canada
TEXAS PANHANDLE REPRESENTATIVE: H. W. Waddell, Pampa, Texas



DURAGAUGE SPECIFIED!

Ashcroft Duragauges are installed in The Pure Oil Company's Crude Stabilization and Gasoline-LPG Recovery Plant at Worland, Wyoming. Contractor: C. F. Braun & Co., Alhambra, California.



THE ASHCROFT DURAGAUGE

...tough, sensitive, accurate!

The Ashcroft Duragauge has a performance record second to none. Long life in "killing" services in refineries, chemical plants, and power stations prove it.

Ashcroft engineers made the Duragauge the standard of industry by discarding traditional theories about pressure gauge construction. They developed a movement with *nylon* pinion gear and bearings.

The Nylon Movement* is light, strong and dimensionally stable. Friction and wear are minimized, corrosion resistance is increased. Shock impact absorption is high. Maintenance is reduced. Overall advantages: greatly improved indicating sensitivity and sustained accuracy. The Duragauge, with Nylon Movement, outlasts all others.

The petroleum industry is faced with demands for increased defense and civilian production. The Duragauge can help assure uninterrupted operation. Get all the facts from your Ashcroft Distributor. Let him help you select the right Duragauge for *your* plant.

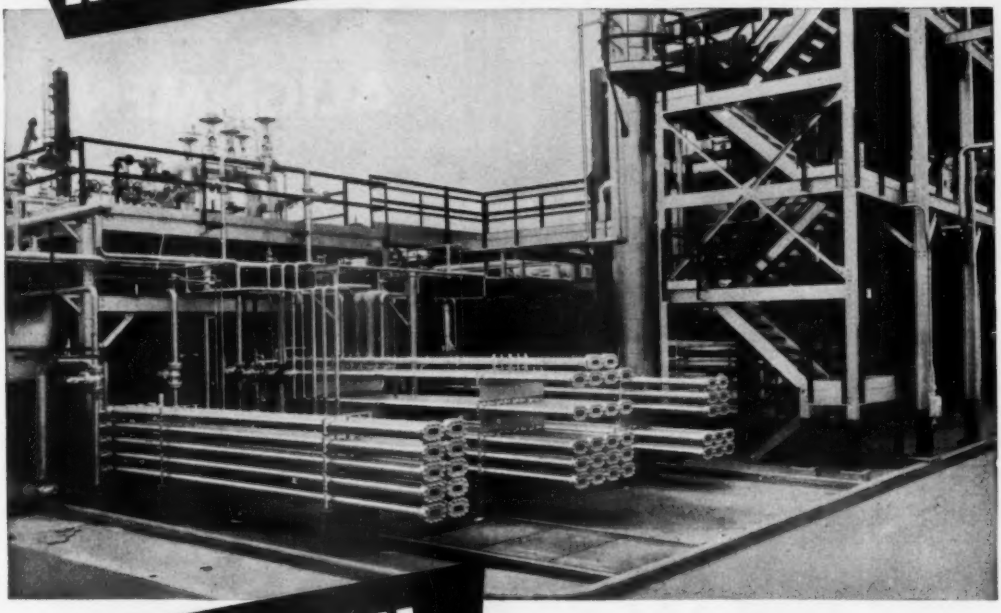
* Patented

ASHCROFT GAUGES

A product of **MANNING, MAXWELL & MOORE, INC.** STRATFORD, CONNECTICUT

MAKERS OF 'ASHCROFT' GAUGES, 'HANCOCK' VALVES, 'CONSOLIDATED' SAFETY AND RELIEF VALVES, 'AMERICAN' INDUSTRIAL INSTRUMENTS. BUILDERS OF "SHAW-BOX" CRANES, 'BUDGIT' AND 'LOAD LIFTER' HOISTS AND OTHER LIFTING SPECIALTIES.

Easier Maintenance in your plant



with **BROWN FINTUBE** *sectional hairpin heat exchangers*

● Brown Fintube Sectional Heat Exchangers make maintenance easier and less costly. The integral welded-on fins *positively can not* work loose from the center tube. Their efficient heat transfer at low "skin" temperatures, and the absence of baffles and stagnant areas in the exchanger, minimize coking and fouling.

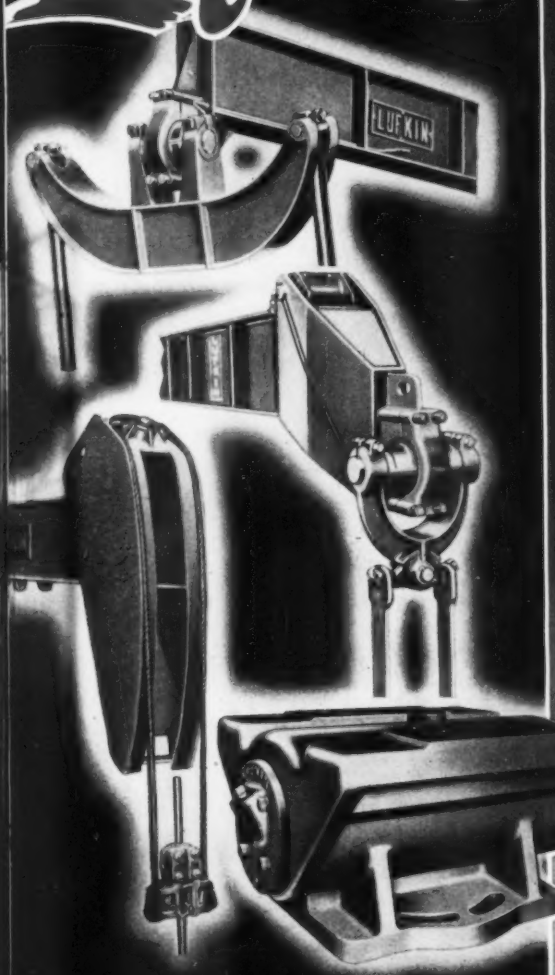
The ingenuous head end assembly, employing a ring joint seal, and the easy to handle rear end cover plate permit an exchanger to be opened, a clean hairpin substituted, and the exchanger put back on stream again in less than ten minutes. For top operating efficiency and easier, less costly maintenance, write for Brown Fintube ***Bulletin No. 481.***

THE BROWN FINTUBE CO.
Elyria, Ohio

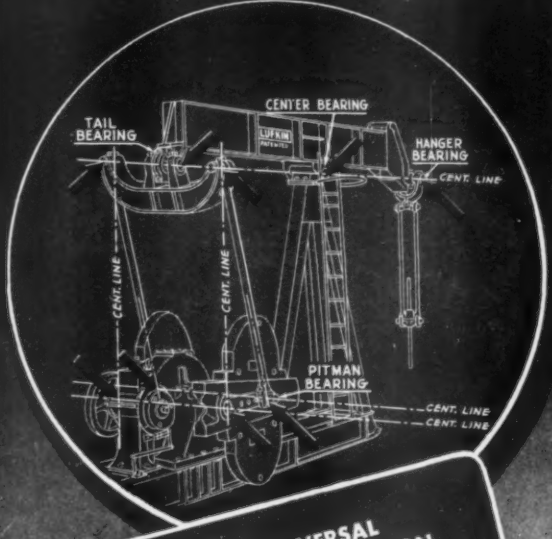
Sectional Hairpin Heat Exchangers
Tank Suction and Line Heaters
Fintube Heaters for Bulk Storage Tanks
Indirect Process Air Heaters
Fintube Heaters for Processing Tanks
Integrally Welded Fintubes for Any Heating, Cooling or Heat Transfer Service

NEW YORK • BOSTON • PHILADELPHIA • WILMINGTON • PITTSBURGH • BUFFALO • CLEVELAND • CINCINNATI • DETROIT • CHICAGO
ST. PAUL • ST. LOUIS • MEMPHIS • BIRMINGHAM • NEW ORLEANS • TULSA • HOUSTON • LOS ANGELES • SAN FRANCISCO

Lufkin



CENTERLINE CONSTRUCTION GIVES STRENGTH... ALIGNMENT



LUFKIN UNIVERSAL CENTERLINE CONSTRUCTION

places the walking beam bearings in a straight horizontal line plane with resulting minimum stress in the beam. This also has a tendency to smooth out the pumping cycle and eliminate beam twist. Inherently the Lufkin Beam has a very high load carrying capacity, being made of wide flange beam sections with stiffeners for added strength. The walking beam is mounted on a bronze bushed, oil bath, center iron.

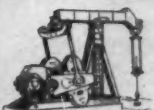
LUFKIN FOUNDRY & MACHINE COMPANY

LUFKIN, TEXAS

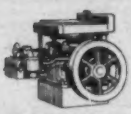
Branch sales and service Houston, Dallas, New York, Tulsa, Los Angeles, Seminole, Oklahoma City, Corpus Christi, Odessa, Kilgore, Wichita Falls, Casper, Wyoming; Great Bend, Kansas.

Lufkin Equipment in CANADA is handled by

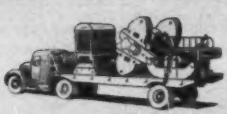
THE LUFKIN MACHINE CO., LTD. 14321 108th Avenue, Edmonton, Alberta, Canada.



LUFKIN PUMPING UNITS



LUFKIN-COOPER-BESSEMER ENGINES

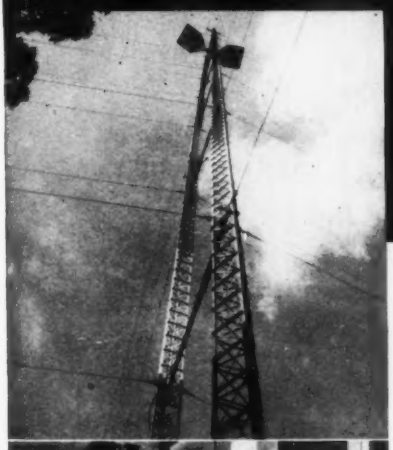


LUFKIN OIL FIELD AND INDUSTRIAL TRUCK TRAILERS

INDUSTRIAL SPEED REDUCERS AND INCREASERS

DIVISION LUFKIN FOUNDRY & MACHINE COMPANY INDUSTRIAL, MILL AND AUTOMOTIVE SUPPLIES

21—Motorola microwave systems are in and working!



Partial List of Microwave Systems

- Aeronautical Radio Incorporated
- State of California
- Pan American Pipeline Co.
- Shell Pipeline
- Panhandle Eastern Pipeline Co.
- Texas Illinois Natural Gas Pipeline Co.
- Mid-Valley Pipeline Co.
- Brazos River Electric Transmission Cooperative
- City of Dayton, Ohio
- Michigan State Police

Including the world's first 1000-mile private operating system

Here is Experience that you can rely on!

Facing a healthy new demand for more serviceable and flexible communication facilities, responsible management turns to Microwave for the extension of communication facilities.

Use the Motorola Microwave circuit for telephone, teletype, telemetering, remote switching and general supervisory control applications.

Motorola is experienced in shaping the systems-design to meet the customers day-in-day-out operational problems.

More than 20,000 installations in the past ten years have proved the reliability of Motorola 2-way radio—and now more than 25,000 miles of Motorola Microwave operating circuits have proved the unquestioned reliability of Motorola Microwave Communications.

Make your new plant truly *new* all the way with Motorola Microwave.

Write for free booklet "The Motorola Microwave Story" and incidentally a Motorola engineer is ready to assist you with generous and thoroughly competent information.

Motorola

Communications and Electronics Division
4545 Augusta Blvd., Chicago 51, Illinois

The Specialists in industrial radio communication systems

22 Years of Leadership in Mobile Radio

World's leading producers (twice as many as all others *combined*) of 2-way mobile radio. Microwave, carrier and control systems and general radio communication equipments.

Remember! *Experience Counts*
Especially in Microwave

New catalytic cracking unit in an Ohio Refinery. Plant equipped with Burgess-Manning Gas and Air Line Snubbers, Exhaust Snubbers, and Flue-Gas Discharge Snubbers.

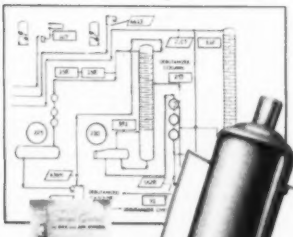
● On engines and compressors used in many stages of refinery process . . . from the crude oil storage tanks . . . desalter . . . distillation column . . . catalytic cracker . . . you will find Burgess-Manning exhaust Snubbers, intake Snubbers, gas and air line Snubbers, flue-gas discharge Snubbers . . . these Snubbers reduce engine exhaust and compressor intake noises to the desired level, and reduce pipe line surging.

● **Specialists in Surge Control in Gas and Air Piping**

To keep pace with new needs in the petro-chemical industries, Burgess-Manning has broadened its research during the past few years to develop a special Snubber capable of reducing surging in compressor gas and air piping systems . . . practically eliminating resultant vibration . . . simplifying metering. Call in Burgess-Manning engineers, today.

BURGESS-MANNING COMPANY

749 East Park Avenue, Libertyville, Illinois



Write for new booklet, "Surge Control."

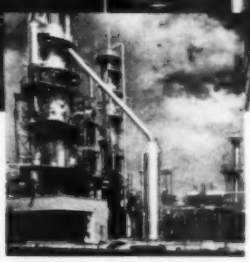
Burgess-Manning Gas and Air Line Snubber.

OTHER PETROLEUM APPLICATIONS

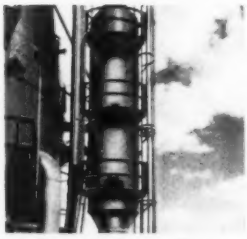
• Oil and Gas Production • Oil and Gas Well Repressuring and Recycling • Gas Transmisson and Distribution • Manufactured Gas Industry • Petro-chemical Process Industry.

From well head through the refinery gate ...it's Burgess-Manning

For Prompt Service
Contact Our New
Engineering & Sales Office
Burgess-Manning Company
1203 Dragon Street
Dallas, Texas

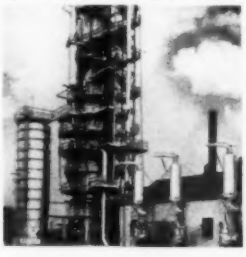


Oklahoma refinery equipped with Burgess-Manning Exhaust and Gas and Air Line Snubbers.



▲ Texas Refinery. Burgess-Manning Snubber installed on flue-gas blow off.

Michigan Refinery equipped with ▼ Burgess-Manning Snubbers.



BACK OF ALL THIS

82 Stores
17 Offices
7 Resident Salesmen

Somewhere in the neighborhood of every derrick in the United States from the Rocky Mountains east, and in Canada, you'll find Jones & Laughlin Supply Company standing by with a store, an office, or a resident salesman.

Customers have at their command equipment, supplies, and experience which dovetail accurately with local conditions . . . plus a healthy, helpful, refreshing concept of responsibility to the industry.

You'll take new interest in the selection of supplies and equipment when you do business with Jones & Laughlin Supply Company. Try it . . . now!

AMERICA NEEDS SCRAP TO MAKE MORE STEEL

"... here's MY warehouse!"

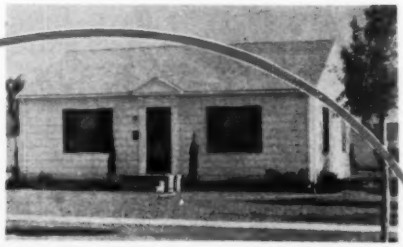
Jones & Laughlin Supply Company

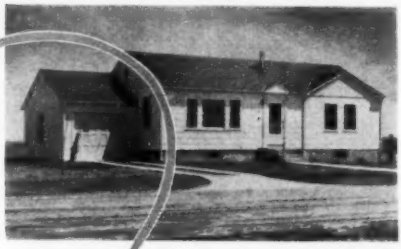
J&L STEEL

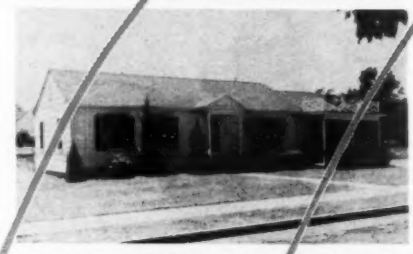
Subsidiary of Jones & Laughlin Steel Corporation

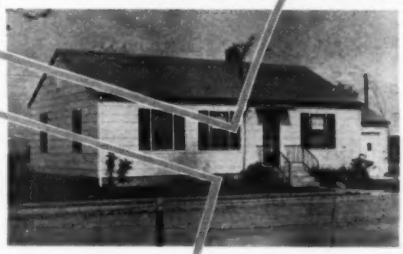
EXPORT: 405 Lexington Avenue, New York, N. Y., U.S.A.
General Offices: TULSA, OKLAHOMA

WHICH HOUSE IS NOT PREFABRICATED?









This is a fooler. ALL the houses here are prefabricated. In fact they are all standard STURDYBILT designs now in use in oil fields in many parts of the country.

Users of STURDYBILT Prefabricated, Demountable Houses know they get *all* the features of conventional houses, plus many other advantages.

STURDYBILT Houses are attractive, comfortable and weather tight. At the same time, they can be easily transported and erected anywhere a truck can go. They can also be "knocked down" and moved to a new location with practically no loss of material.

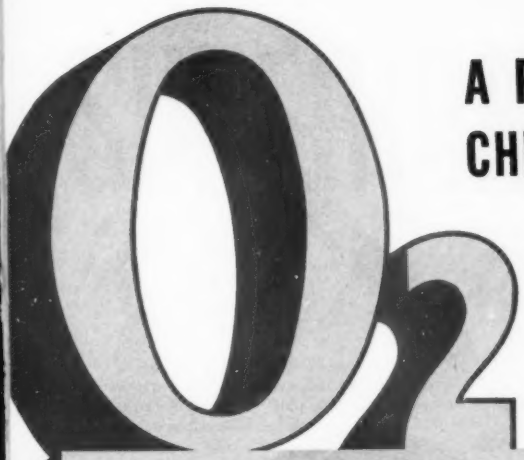
Specify STURDYBILT Prefabricated Houses for all your field housing needs.

MANUFACTURERS OF SPECIAL WOODWORK; DISTRIBUTORS OF JOHNS-MANVILLE BUILDING MATERIALS; CURTIS WOODWORK

STURDYBILT PREFABRICATED, DEMOUNTABLE HOUSES

SOUTHERN MILL & MANUFACTURING CO. • TULSA, OKLAHOMA

STURDYBILT HOUSES COMPLY WITH COMMERCIAL STANDARD CS125 OF THE NATIONAL BUREAU OF STANDARDS FOR PREFABRICATED HOMES



A REACTIVE AND IMPORTANT CHEMICAL "BUILDING BLOCK"

with constantly mounting applications in many industrial fields

CHEMICAL AND PHYSICAL PROPERTIES OF OXYGEN

Chemical Symbol	O_2
Atomic Number	8
Periodic Group	VI
Atomic Weight	16.00
Molecular Weight	32.00
Molecular Diameter	3.39×10^{-8} cm
Isotopes	16, 17, 18
Allotropes	Ozone (O_3)
Valence	2 and 6
Concentration in Dry Air	20.93%
Boiling Point (atm. press.)	—183.1°C
Melting Point	—218.8°C
Critical Temperature	—118.8°C
Critical Pressure	49.7 atm.
Critical Density	0.430 gm/cc

Vapor Pressure at Various Temperatures:

Pressure mm. Hg	Temperature °C.
0.76	—219.8
7.60	—211.5
76.0	—200.6
190.0	—194.3
380.0	—189.0
760.0	—183.1

Latent Heat of Vaporization	1635.8 cal./mol. @ B.P.
Latent Heat of Fusion	106.0 cal./mol. @ M.P.
Heat of Reaction with Carbon (Coke)	97,000 cal./mol.
Heat of Reaction with Carbon (Graphite)	94,400 cal./mol.
Heat of Reaction with Hydrogen	68,317 cal./mol.

Boiling Points of O_2 - N_2 Mixtures:
1 atm. Pressure

O_2%	BP °K
90	87.7
95	88.9
98	89.9
99	90.0
99.5	90.1

Entropy: T °K	Cal gm mole °K
1 Atm. 50	12.52
100	40.58
150	43.31
200	45.36
250	46.84
273.1	47.75
298.1	48.04

Molal Volume: 0° C, 1 atm. (g) 22,397 cc

Specific Gravity:	@ 0° C (g)	1.429
	@ —182.5° C (l)	1.14
	@ —252.5° C (s)	1.426
Specific Heat:	BP to 25°C (g)	6.98 cal/gm mol.
	—183° to —200°C (l)	12.62 cal/gm mol.
	—221.8°C (s)	10.74 cal/gm mol.
Coefficient of Thermal Expansion:	0° C to 100° C (g)	3.674×10^{-3}
	—195° C (l)	4.10×10^{-3}

Compressibility Factor: $PV = 1.0$ @ 1 atm., 0° C

P, atm.	0°C	50°C	100°C	200°C
1	1.0000	1.1838	1.3674	
10	0.9913	1.1796	1.3661	
50	0.9569	1.1642	1.3630	
100	0.9214	1.1520	1.3651	
200	0.9140		1.4000	1.8190
300	0.9625		1.4530	1.8850
400	1.0515		1.5320	1.9610
500	1.1560		1.6220	2.0500

$\frac{C_p}{C_v}$ (atm. pressure)	0°C.	$\frac{C_p}{C_v}$
	15	1.401
	—76	1.415
	—181	1.45

Vanderwaal's Constants: $a = 1.360$ (liter², atm. mole⁻²)
$b = 0.03183$ (liters, mole⁻¹)

Solubility in Water: 4.89 cc in 100 cc @ 0° C
2.6 cc in 100 cc @ 30° C
1.7 cc in 100 cc @ 100° C

Viscosity: @ BP (g) 0.00736 CP
@ MP (l) 0.883 CP
@ 0° C (g) 0.0192 CP
@ —193° C (l) 0.245 CP

Moisture Content of Saturated Oxygen .130 gm/ft³ @ 0°C

Thermal Conductivity:

	$\frac{cal.}{cm\text{-}sec\text{-}°C}$
0°C (g)	5.7×10^{-6}
—78.4°C (g)	4.29×10^{-6}
—191.4°C (g)	1.72×10^{-6}

Index of Refraction: —181°C (g) 1.221

Remember that oxygen is one of the least expensive elements available in pure form, and is finding increasing use in more and more fields. As supplier or user, remember that Chemical Plants builds complete production units in all commercial sizes—based on the processes of Gesellschaft fuer Linde's Eismaschinen, A. G.

CHEMICAL PLANTS DIVISION
BLAW-KNOX CONSTRUCTION COMPANY
PITTSBURGH • TULSA • NEW YORK • PHILADELPHIA • CHICAGO • BIRMINGHAM • WASHINGTON, D. C.

for
AIRCO'S 800
WELDING
TORCH

no job
too
tough

Airco's versatile 800 torch meets the demands of today's speeded-up production and maintenance schedules. Flame-cleaning . . . brazing . . . hard-facing . . . welding the heaviest sections . . . whatever the work, in the shop, you can be sure that the "800" will handle it quickly and economically.

For long life, the torch head is made of durable monel. Sturdy brass forgings and seamless brass gas tubes stand up to the roughest handling. All components require little maintenance.

The "800" is unexcelled for brazing, or for straightening and bending operations. A wide range of tips is available. By adding a cutting attachment, the Airco 800 torch can be quickly converted to cut steel from thin sheets up to 6" plate—ideal for the occasional cutting job.

Dependable performance? You're sure of it from the 800 torch, thanks to Airco's 35 years of engineering know-how. Learn about Airco's complete line of arc and oxyacetylene equipment and supplies. Get in touch with your local Airco office today. Representatives will be glad to help you with any welding or cutting problem.

Costs come down under the Airco plan

AIRCO

AIR REDUCTION

AIR REDUCTION SALES COMPANY • AIR REDUCTION MAGNOLIA COMPANY
AIR REDUCTION PACIFIC COMPANY
REPRESENTED INTERNATIONALLY BY AIRCO COMPANY INTERNATIONAL
Divisions of Air Reduction Company, Incorporated
Offices in Principal Cities

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No matter what your operation in the oil and gas industry—drilling, production, pipelining, processing or refining, SUPERIOR can give you top-notch supplies and equipment for *every* need. SUPERIOR covers the field with a complete line of petroleum, gas and industrial supplies, pipe and machinery.

...ess to deal with a *SUPERIOR* store ...ou're always close to a complete stock of ...ment, operating supplies and expert technical ...ice. When *you* need good supplies in a hurry, ...ll your SUPERIOR store.

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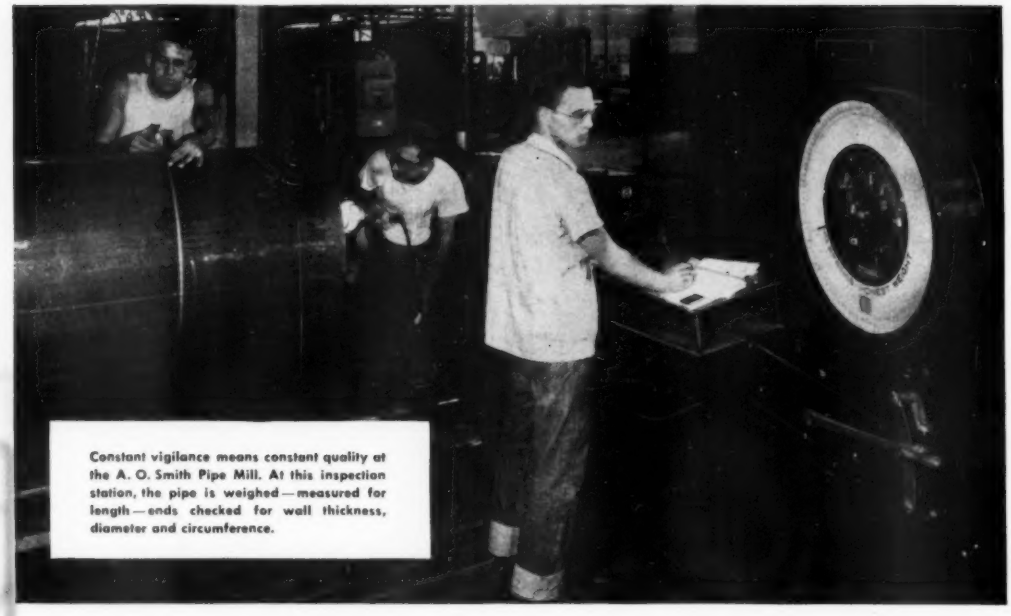
- Dallas, Texas
- Abilene, Texas
- Houston, Texas
- Midland, Texas

NEW YORK CITY — Room1212 — 502 Park Ave.
Telephone: El Dorado 5-3572

SUPERIOR IRON WORKS & SUPPLY COMPANY, INC.

1202-04 MARSHALL STREET • P. O. BOX 1800 • SHREVEPORT, LA.

FIRST names in pipelines depend on the FIRST* name in line pipe



Constant vigilance means constant quality at the A. O. Smith Pipe Mill. At this inspection station, the pipe is weighed—measured for length—ends checked for wall thickness, diameter and circumference.

A. O. Smith contributes toward lower pipe line installation costs

Uniformity contributes to the quality of the pipe and thus reduces the cost of installation. Uniform, round ends of consistent wall thickness makes for faster lineup in the field—simplifies the welding procedures—reduces total installation time. These are important contributions toward reducing the overall cost of the pipe line—an economic advantage enjoyed by A. O. Smith customers.

To Begin With, plate is used that comes from the mill in uniform thickness and permits careful inspection of both surfaces.

Then our internal expanding process (in use by A. O. Smith for over 20 years) makes certain the pipe is round, straight and of uniform diameter.

Finally complete inspection both during manufacturing process and after finishing makes sure that all pipe shipped meets the high standards established by A. O. Smith.

* FIRSTS by A. O. Smith • Welded line pipe • Internal expanded pipe • Light wall large diameter pipe • World's largest producer of large diameter welded steel pipe.

DEPENDABILITY *through* **RESEARCH** *and* **ENGINEERING**

A.O.Smith

LINE PIPE • CASING

Chicago 4 • Dallas 2 • Denver 2 • Houston 2
Los Angeles 22 • Midland 5, Texas
New Orleans • New York 17 • Pittsburgh 19
San Francisco 4 • Seattle 1 • International
Division: P.O. Box 2023, Milwaukee 1

Can You Use the "UTILISCOPE"?

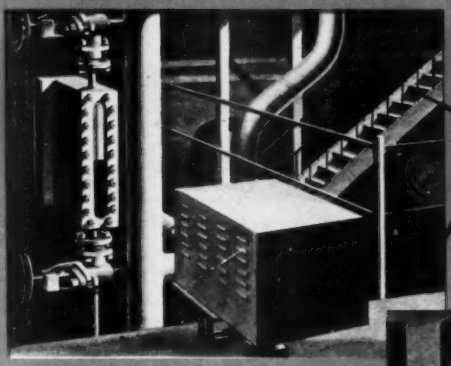
The advertisement at the right appeared in BUSINESS WEEK. It has been suggested that this ad contains considerable food for thought for the readers of the OIL & GAS JOURNAL also. The central station application illustrated here may not interest you but it probably will suggest other uses for the "Utiliscope" in your operations.

If you want to look into the possibilities of the "Utiliscope", simply write us for a copy of Bulletin 1025A which explains the equipment and shows various applications. Please address your request to

Diamond Power Specialty Corporation
Department "A"
Lancaster, Ohio

NOW You Can *See* Where You Can't *Look*

With the DIAMOND "UTILISCOPE"
(WIRED TELEVISION)



"Utiliscope" camera replaces man for watching boiler water level.

Operator several floors below "sees" water level on "Utiliscope" receiver.

1 Man
DOES THE WORK OF
2 or More

Here's how many central stations are saving manpower and improving operation with the Diamond "Utiliscope" (Wired Television).

Water gauges on giant power boilers are several floors above the control panel. They cannot be seen by the operator, yet they must be watched constantly as the modern boiler can quickly lose its water to a dangerous level. The old way is to have water tenders patrolling galleries, reporting to the operator. It's a hot, uncomfortable, monotonous job. Tenders get careless and communications bring errors.

Now, in modern installations, a "Utiliscope" camera watches each gauge. A clear and unmistakable image is brought right to a "Utiliscope" receiver mounted in the control panel. The operator can always "see" the water level . . . water tenders are no longer necessary and communication errors are impossible.

The Diamond "Utiliscope" is surprisingly simple and low in cost. No special skill is needed for installation and operation. Its stability and reliability are exceptional. Ask for Bulletin 1025 which shows a wide variety of cost-cutting applications.

OTHER USES—Studying destructive tests of engines • Watching flow of molten steel • Observing conditions inside furnaces • Viewing nuclear research • Coordinating materials flow on conveyors.

"Utiliscope" (Reg. U. S. Patent Office)

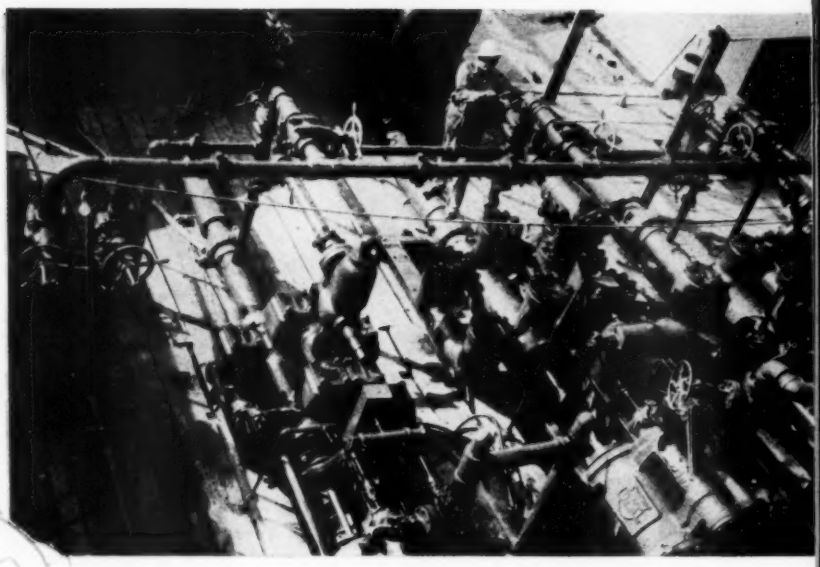
4972

DIAMOND POWER SPECIALTY CORP.
FIRST IN INDUSTRIAL TELEVISION
LANCASTER, OHIO • *OFFICES IN 39 PRINCIPAL CITIES*
Diamond Specialty Limited — Windsor, Ontario
Since 1903, Diamond has Manufactured Quality Equipment For Industry

WRITE FOR BULLETIN 1025

Keep Mud Line Pressures (and costs) In Line With "Flex-Seal"

—The Only Valve Designed Specifically For Mud Line Service



There's no other valve like a Cameron "Flex-Seal" for, unlike ordinary gate valves and stop cocks which were designed for a number of services, "Flex-Seals" were designed expressly for use on lines handling abrasive fluids: drilling mud, cement slurry, etc. The cutting action of these fluids is absorbed by a resilient oil – resistant synthetic rubber flow-way insert which, after long service, may be quickly and easily replaced by the drilling crew. No special tools are required and the new insert costs only a few dollars.

Cameron 1st *name in drilling control*

CAMERON IRON WORKS, INC.

P. O. BOX 1212 HOUSTON, TEXAS

Export: 74 Trinity Place, New York, N. Y. Represented in the sterling area by: British Oilfield Equipment Co., Ltd., Duke's Court, St. James's, London S.W.1, Eng.

LOST:

110,000,000 Man Hours Annually due to Industrial Eye Accidents

YOU CAN PREVENT THIS TRAGIC WASTE IN YOUR PLANT WITH GOGGLES COSTING $2.30

Eye accidents cost industry per year about 110,000,000 man hours or about $160,000,000 apart from compensation, medical, idle machine charges and other costs. Yet the safety goggles that *prevent* 98% of eye accidents average $2.30 in cost or only 78 cents more than the loss of just *one man hour* of productive time. (Current average hourly earnings of factory workers $1.52.)

In these days of capacity production and short supply of skilled workers, an AO Eye Protection Program deserves your serious consideration — *more than ever.* Particularly when it can pay for itself within six months time in the production it protects and the costs it can save. Ask your nearest AO Safety Representative to show you how.

FACTS TO REMEMBER:

Industrial eye injuries cost over $5 per employed worker per year — with compensation averaging $328 per injured man even in the low-cost year of 1938.

American Optical

SAFETY PRODUCTS DIVISION

SOUTHBRIDGE, MASSACHUSETTS • BRANCHES IN PRINCIPAL CITIES

REGARDLESS OF SIZE . . . they must have *Dimensional Accuracy*

This photographic fantasy is simply to emphasize the exceptional dimensional accuracy and uniformity of Midwest Welding fittings that saves time in welding and reduces piping costs.

MIDWEST
PIPING & SUPPLY CO., Inc.

Main Office: 1450 South Second Street, St. Louis 4, Mo.
Plants: St. Louis, Passaic, Los Angeles and Boston
Sales Offices: New York 7—30 Church St. • Chicago 3—79 West Monroe St.
Los Angeles 33—520 Anderson St. • Houston 2—1213 Capitol Ave.
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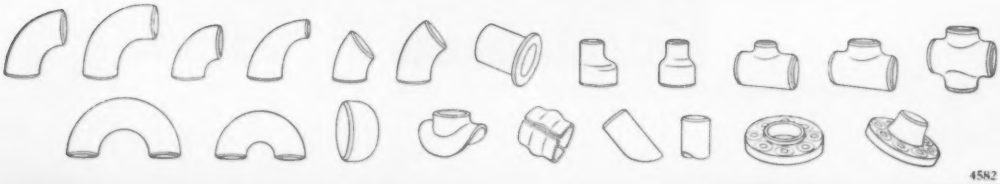
STOCKING DISTRIBUTORS IN PRINCIPAL CITIES

MIDWEST WELDING FITTINGS IMPROVE PIPING DESIGN AND REDUCE COSTS



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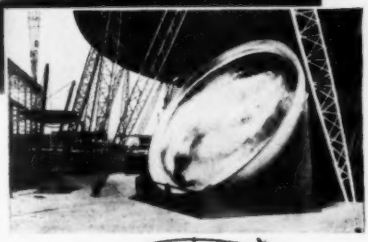
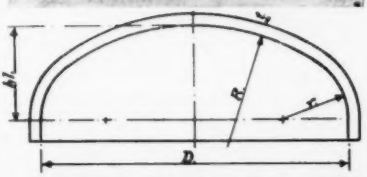


SEMI-ELLIPSOIDAL HEADS are available, with varying knuckle radii and depth, in a wide range of sizes from 5′ 0″ inside diameter to a finished Head produced from a flat plate 18′ 0″ in diameter. Flat Flanged Ends for Boiler back and front plates are also a product of the "Rotarpress" plant. Yet another part of the "Harvey" service to Industry is the production of Die-pressed Dished and Flanged Ends varying in size from 6″ diameter up to 9′ 0″ diameter.

Manufactured to Lloyds Rules, A.O.T.C. and A.S.M.E. Codes in Mild Steel, Alloy Steels, Nickel, Nickel-clad, Stainless-clad, and Chrome-clad Steels up to 4″ in thickness.

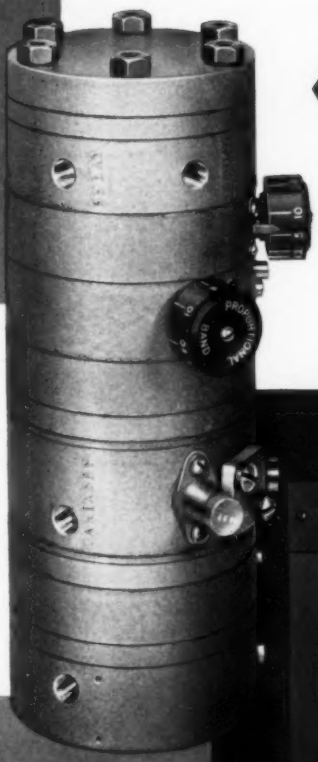
For full details and tables send for List OG 790.



STANDARD PROPORTIONED HEADS

D	R	r	hl	t. range
5′ 0″	4′ 0″	10″	15½″	⅜″—4″
5′ 6″	4′ 6″	10″	16½″	⅜″—4″
6′ 0″	5′ 0″	12″	18 7/16″	⅜″—4″
6′ 6″	5′ 6″	12″	19½″	⅜″—4″
7′ 0″	6′ 0″	12″	20″	⅜″—4″
7′ 6″	6′ 6″	12″	20½″	⅜″—4″
8′ 0″	6′ 6″	16½″	25½″	⅜″—3½″
8′ 6″	7′ 0″	16½″	26½″	⅜″—3½″
9′ 0″	7′ 6″	16½″	27″	⅜″—3½″
9′ 6″	7′ 6″	16½″	28½″	⅜″—3½″
10′ 0″	8′ 0″	16½″	29 7/16″	⅜″—3″
10′ 6″	8′ 0″	23″	35″	⅜″—3″
11′ 0″	9′ 0″	23″	34½″	⅜″—2½″
11′ 6″	10′ 0″	23″	34 7/16″	⅜″—2½″
12′ 0″	11′ 0″	23″	34½″	⅜″—2″
12′ 6″	11′ 0″	23″	36½″	⅜″—2″

Important

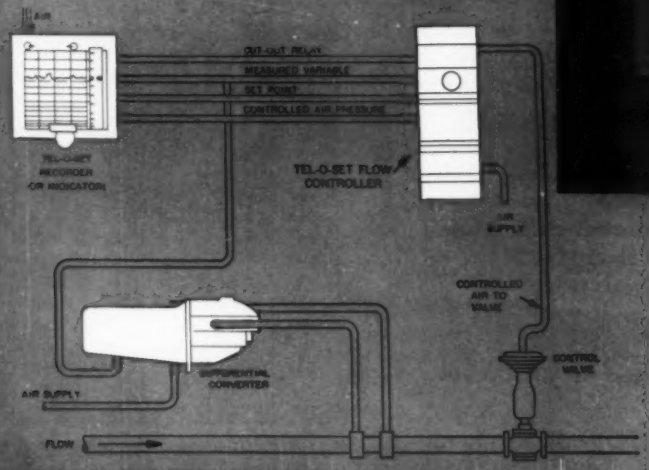


TEL-O-SET CONTROLLER

Available in adjustable and fixed proportional band models, and with three control forms . . . for flow, temperature, pressure, level and other process variables. Universal bracket permits optimum flexibility in mounting . . . coded, interchangeable sections and split manifold contribute to simplified maintenance. Write for Specification Sheet No. 768.

TEL-O-SET RECORDER

Features withdrawal of chassis for full 8-hour chart visibility without interrupting operations, bumpless shifting from automatic to manual operation, all adjustments from front of panel, built-in adjustable restrictions for pulsating flow . . . requires panel space just $5\frac{1}{16}$" high by 5" wide. Write for Specification Sheet No. 769.



TYPICAL ENGINEERED *TEL-O-SET* CONTROL SYSTEM—Pictured in this diagram are the elements of the *Tel-O-Set* Family, designed and built as an integrated loop. Here the system is applied to the control of flow with the *Differential Converter* used as transmitter.

TEL-O-SET INDICATOR

Can be used with any pneumatic transmitter, having a 3-15 psi controlled air output, regardless of the primary element being used. Provides indication of process variable, set-point of controller or controlled air pressure to valve when on automatic control . . . is easily shifted to manual operation. Panel cut-out size same as recorder. Write for Specification Sheet No. 770.

Contribution to Process Control

. . . THE HONEYWELL TEL-O-SET FAMILY

THIS pace-setting pneumatic control system is ready for application to a host of processes demanding a new high in speed, precision and accuracy . . . for almost any process variable. Developed as part of a family relationship, each unit complements the others in producing a system of superior performance.

Used with any one of a group of Honeywell measuring elements . . . for flow, temperature, pressure, liquid level, etc. . . . the *Tel-O-Set* system is destined to make important contributions to the improvement of process control throughout industry.

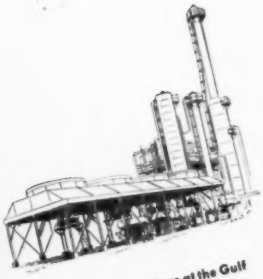
For more detailed information, send for the literature mentioned in the descriptions at left . . . or call in our local engineering representative for a discussion of your process control problems.

MINNEAPOLIS-HONEYWELL REGULATOR Co., *Industrial Division*, 4488 Wayne Ave., Philadelphia 44, Pa.

MINNEAPOLIS **Honeywell**

Brown Instruments

H HONEYWELL



Cleveland vertical drives at the Gulf Oil Corporation's gasoline plant, Eunice, New Mexico. 25 units are utilized in cooling operations at this natural gasoline plant.

Trouble-free service for years with CLEVELANDS

HUNDREDS of Clevelands drive cooling tower fans at refineries. Reports from plant operators indicate that they are uniformly dependable. Regardless of dust and exposure to extreme heat and humidity, they operate continuously with minimum attention, at high speeds and for long periods of time.

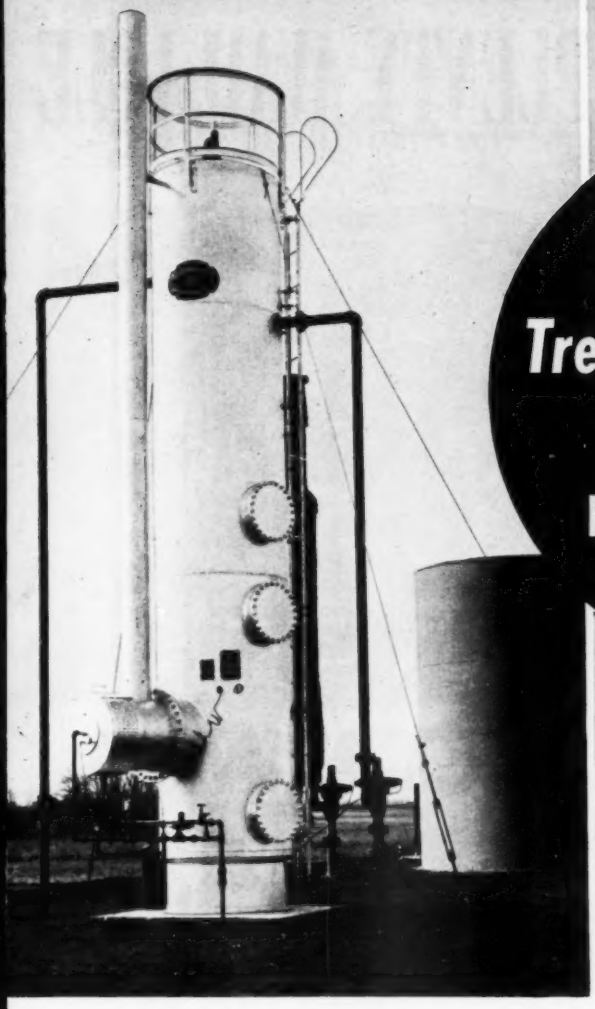
Cleveland vertical drives are compact in construction, ruggedly built to operate anywhere under adverse conditions. They are engineered to carry the high thrust and radial loads normally encountered in cooling tower service. Simplicity of design makes for easy installation, adjustment and service in the field.

There are other Cleveland units available for any service where the many advantages of a powerful, right angle drive are desired.

Write for Bulletin 135 which gives a full description and technical data on the Type CU drive—Cleveland's special cooling tower unit. Ask also for literature on other types of worm gear drives.

The Cleveland Worm & Gear Company, 3286 East 80th Street, Cleveland 4, Ohio.

Affiliate: The Farval Corporation, Centralized Systems of Lubrication. In Canada: Peacock Brothers Limited.



SETTLE YOUR *Treating Problems* WITH PARKERSBURG

● The most important step in settling emulsion treating problems is selecting the proper size and type of equipment. And the two most important factors controlling selection of the right treater are heating capacity required and quiet settling time allowed a given volume of oil.

Using this proven formula, Parkersburg offers 8 different types of treaters in a total of 32 sizes. From this wide range of emulsion treaters, Parkersburg can recommend exactly the treater required to meet the production characteristics of any given well. Ask your Parkersburg Representative about the size and type to meet your treating problem.

THE PARKERSBURG RIG & REEL COMPANY
Parkersburg, West Va.

No. 5119

PARKERSBURG
PRESSURE EQUIPMENT

HORIZONTAL AND VERTICAL SEPARATORS • HYRECO • HYDRACEPTER • SCRUBBERS • TREATERS • HEATERS

Manufactured in Houston, Texas

THERE'S PLENTY AVAILABLE

Magcobar

DRILLING MUDS

In these times of shortages, we are glad to be able to tell you that **there is plenty of Magcobar drilling mud available** at fair and reasonable prices for your present and future drilling operations.

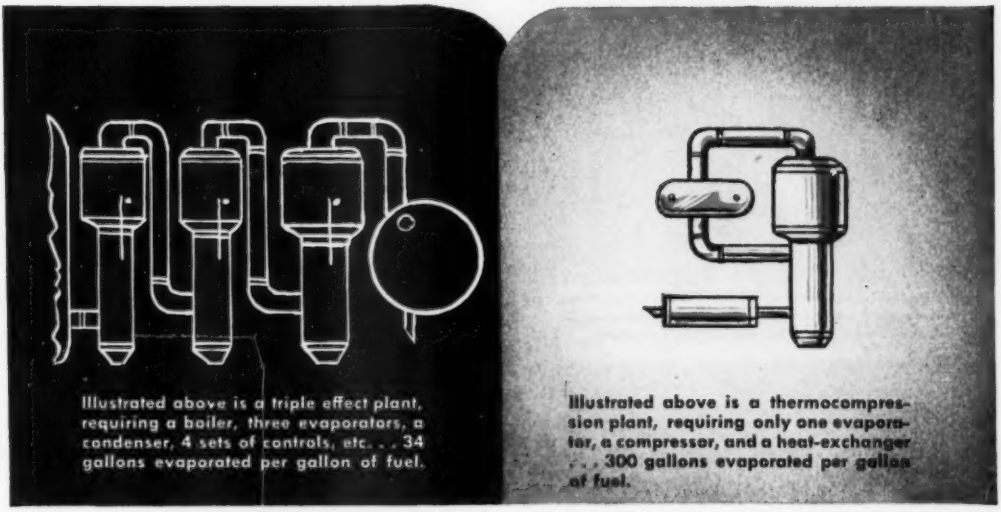
We are also proud to tell you **why** there is plenty of mud weight material . . . even though operators are now using mud weight material at the rate of 500,000 tons per year: THERE IS PLENTY OF MUD WEIGHT MATERIAL AVAILABLE AT FAIR AND REASONABLE PRICES TODAY BECAUSE MAGCOBAR PIONEERED AND DEVELOPED A PROCESS TEN YEARS AGO THAT INCREASED THE COUNTRY'S BARITE RESERVES BY MORE THAN 15,000,000 TONS.

Look for the Magcobar dealer sign when you need mud. More than 350 Magcobar Dealers from Canada to the Gulf Coast are ready to serve you.

MAGNET COVE BARIUM CORPORATION
ONE OF THE DRESSER INDUSTRIES
HOUSTON, TEXAS • MALVERN, ARKANSAS

Magcobar
Complete
DRILLING MUD SERVICE
DEALER

The difference between Night and Day



Illustrated above is a triple effect plant, requiring a boiler, three evaporators, a condenser, 4 sets of controls, etc. . . 34 gallons evaporated per gallon of fuel.

Illustrated above is a thermocompression plant, requiring only one evaporator, a compressor, and a heat-exchanger . . . 300 gallons evaporated per gallon of fuel.

with MECO THERMOCOMPRESSION EVAPORATORS

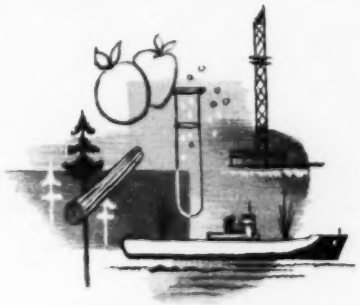
lower cost — much greater efficiency!

LOWER FUEL COST

No matter what the job is—evaporation for concentration or distilled water production—you will find that MECO thermocompression evaporators do the job better at less cost! For instance, one MECO unit is equivalent in efficiency to a 27 *effect*, multiple effect conventional plant . . . can make *pyrogen free*, chemically pure water.

LOWER OPERATION & MAINTENANCE COST

The higher the efficiency, the fewer the components, the more simple in principle the machine is—the less the cost of operation! Our brochure will describe principles of MECO thermocompression evaporation and the reasons why it will keep the operating cost of your job down, way down! MECO's working parts are so few and so easy to keep up that an average mechanic can do it with ease. High quality design insures long life.



Sea water for distillation for the oil industry . . . Concentration for the Chemical industry . . . uses in the paper, fruit juice and many other industries.

MECO

MECHANICAL EQUIPMENT CO., INC.

NEW ORLEANS, LOUISIANA

This equipment is built under various patents belonging to Mechanical Equipment Company, and Arthur D. Little, Inc.

MECHANICAL EQUIPMENT CO., Inc.
861 Carondelet St.
New Orleans, La.

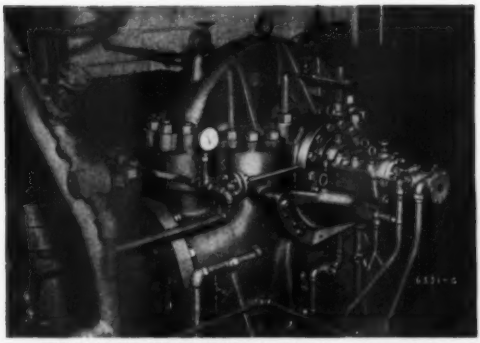
Please send me bulletin concerning MECO thermocompression evaporation units.

Name _____

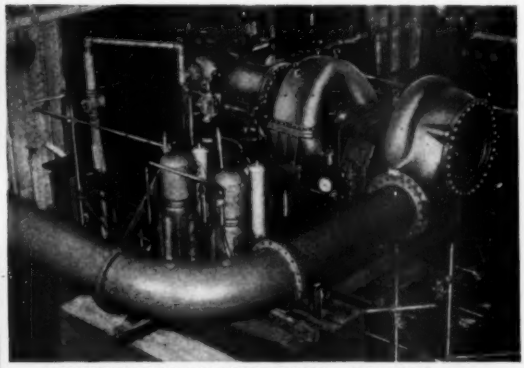
Address _____

DE LAVAL CENTRIFUGAL COMPRESSORS

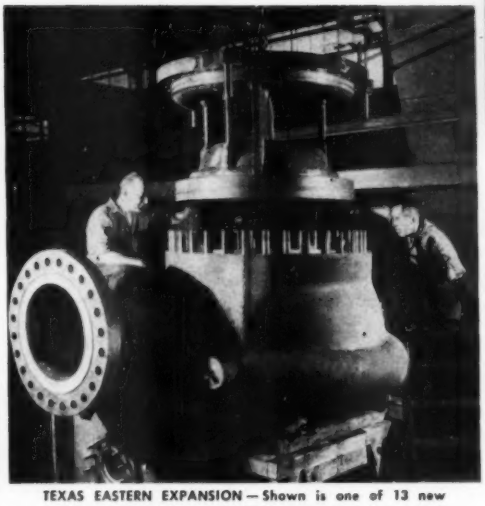
On All 4



TEXAS EASTERN TRANSMISSION CORP. — Here is one of the many De Laval motor-driven centrifugal compressors originally installed on the Big and Little Inch pipelines.



TRANSCONTINENTAL GAS PIPE LINE CORP. — This is the first steam turbine-driven compressor to go in service. Two other De Laval 5,000 hp units have been installed at station 7, McComb, Miss.



TEXAS EASTERN EXPANSION — Shown is one of 13 new De Laval motor-driven centrifugal compressors being built for Texas Eastern's expansion program.

On Order

EL PASO NATURAL GAS CO. — Two 5,000 hp gas turbine-driven De Laval centrifugal compressors are currently on order for El Paso's 26 and 30-inch natural gas pipelines.

Performance records of De Laval centrifugal compressors, used to transmit high pressure gas, have been outstanding. Leakage past the shaft seals has been zero, consumption of sealing oil insignificant and efficiency guarantees have been more than met. These and other important advantages are due to the basic simplicity of the De Laval design.

If a careful study of your needs indicates that centrifugal compressors are practical from an economic standpoint, it will pay you to consult our Field Engineer. He will give you the benefit of our experience on all four major pipelines.

50th Anniversary

DE LAVAL *Centrifugal Compressors*

DE LAVAL STEAM TURBINE COMPANY • TRENTON 2, NEW JERSEY

DL-119

more and more pipelines use

purchased *Electric Power* to provide the push...

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*(a patented alloy)**

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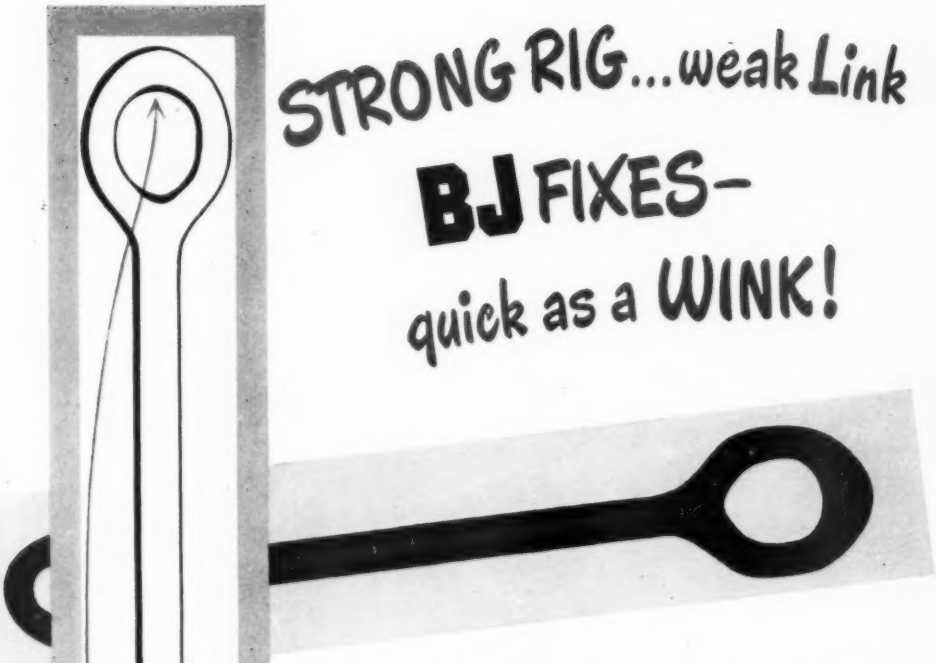

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"Unless the oil industry receives more favorable consideration from federal defense agencies, America in the very near future may be unable to meet her defense obligations for the lack of oil.

"We must have without further delay a realistic price adjustment for crude and an increased steel allocation if we are to expect a free enterprise industry to meet the pressing need for vastly expanded exploration and development.

"Figures show that today for the first time the industry is having to report to the outside money markets to make up funds heretofore provided by reinvestments of earnings. No industry can be expected to expand production sufficiently while being denied by taxes enough of its earnings to replace depreciation and depletion and pay stockholders a fair rate of return.

R. L. Foree, president, Texas Independent Producers and Royalty Owners Association, addressing association membership dinner, San Angelo, Tex.

Oil-Shale Position

"You doubtless have noted a recent increase in public interest in the possible production of oil from shale, accompanied by an increasing amount of confusion on the subject. Let's cut through prejudice and propaganda and examine the facts.

"First, we know that in an area near Rifle, Colo., there are several ledges of shale, the richer one of which alone contains upward from 80 billion barrels of recoverable oil. Union Oil Co. holdings in this one ledge will yield approximately 3 billion barrels of oil, or more than five times the company's known crude-oil reserves.

"Mining, retorting, and refining techniques have been developed which can be put into practical operation whenever needed. The Bureau of Mines has done an excellent job in developing efficient mining procedures. As you know, Union Oil Co. has been active in oil-shale research and has been particularly successful in developing a practical shale-oil retort.

"Despite these advances, oil from shale cannot yet compete economically with crude oil. What is more significant, the nation's petroleum production is adequate for its present fuel needs.

"There is no justification for the federal Government, or any of its agencies, to utilize taxpayers' funds to start up large-scale synthetic-fuels programs. When production of fuel from this source becomes economically feasible or is needed for defense, it can be best accomplished by American industry."

Reese H. Taylor, president, Union Oil Co. of California, addressing the New York Society of Security Analysts.

Competitor Welcomed

"It is a healthy thing for the industry and the community for a competing pipe line to come into the Rocky Mountain territory.

"The sooner it (Platte pipe line) gets into operation, the better we will like it. In short, we welcome this competitor."

J. L. Burke, president, Service Pipe Line Co., speaking before the Sheridan, Wyo., Chamber of Commerce.

Foreign Oil's Importance

"Our country, with 25 billion barrels of underground oil, has less than one-third of the world's total. We, however, produce one-half and consume nearly two-thirds of the total oil of the world.

"This means we are depleting our petroleum resources faster than other countries and we are becoming more and more dependent on foreign oil. We are not running out of oil in this country but our new discoveries are not keeping pace with our consumption. Before the war we were not

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only able to supply our own requirements, but we had a net exportable surplus of 400,000 bbl. a day, which moved principally to Europe. Today, we are net importers of about 550,000 bbl. daily.

T. L. Lenzen, general manager, Eastern Hemisphere operations, Standard Oil Co. of California, addressing California Bankers Association Trust Investment Conference, Los Angeles.

Government Is Inconsistent

"A government that has repeatedly fallen back upon big business in recent years in every time of national crisis is not in an appropriate role in seeking to break up the very industrial institutions upon which it has depended.

"How inconsistent, for example, to seek on the one hand to break up Du Pont Corp. and on the other hand to assign to it the responsibility for the development of the hydrogen bomb."

A. A. Stambaugh, chairman of the board, Standard Oil Co. of Ohio, speaking before the North American Gasoline Tax Conference, Columbus.

Reward for Threats?

"On the one hand, this government expresses, and rightly, grave concern over the eruptions in the Middle East which have already cost the West the vital oil of Iran and threaten equally great losses in Egypt and possibly Iraq. Yet on the other hand this government uses its influence and its dollars to aid the governments that are making these threats.

"Like the President, we think that the Middle East is important to the West and that there is much that can be done in developing this area. Indeed, it may well be that the violent nationalism of this area has erupted so far that there is no stopping it. But we think no one ought to make the mistake of believing that it can be stopped, or even made orderly, by rewarding it."

Editorial in Wall Street Journal.

THE MARTIN-DECKER TYPE "D" ANCHORING WEIGHT INDICATOR

PROVIDES THE ULTIMATE

In Accurate—Sensitive—Dependable—Rugged Drilling Control and Wire Line Anchoring

The Type "D" Weight Indicator is positively unaffected by atmospheric temperature changes and accuracy is unimpaired by small amounts of air in the system, leaks or fluid volume. It shows the Weight-On-Bit by the magnified Vernier method. (Set the NET-WEIGHT-ON-BIT DIAL on zero and read.) All readings are shown directly in pounds.

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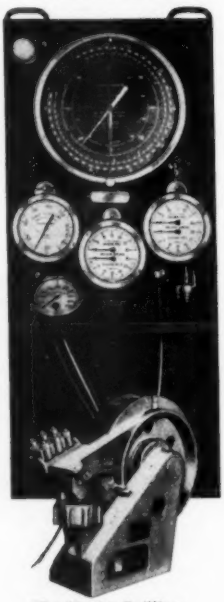
A CONVENTIONAL WEIGHT INDICATOR *for Total Weight of the Drill String—showing tight hole, stuck pipe, load on derrick, etc. Every weight indicator need is wrapped up in one dependable package.*

A SIMPLE RECORDER gives the engineer a permanent record of each 24 hours of operation. The Gauge is placed in front of the driller where the slightest change in hook load or bit weight is instantly revealed.

HYDRAULICALLY OPERATED—positively unaffected by atmospheric changes. Dead line whip can neither affect Weight Indicator reading nor damage the instrument.

REQUIRES NO ADJUSTMENT for Number of Lines Strung or Cable Diameter. No Gadgets or Shims to Get Lost. Built-in illumination provides greater safety and convenience. Furnishes precise WEIGHT-ON-BIT DIRECTLY IN 1,000 LBS. and also hook load and derrick load DIRECTLY IN POUNDS.



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- Simple installation

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CALENDAR

December

American Institute of Chemical Engineers, annual meeting, Chalfonte-Haddon Hall, Atlantic City, December 2-5.

Chemical Specialties Manufacturers Association, thirty-eighth annual meeting, Mayflower Hotel, Washington, D. C., December 3-4.

American Chemical Society, southwestern sections, seventh regional meeting, University of Texas, Austin, December 6-8.

Interstate Oil Compact Commission, annual meeting, Hotel Marion, Little Rock, Ark., December 11-12.

American Association for the Advancement of Science, annual meeting, Philadelphia, December 27-28.

1952 Meetings

January

Society of Automotive Engineers, annual meeting, Hotel Book-Cadillac, Detroit, January 14-18.

February

American Society for Testing Materials, Committee D-2 on petroleum products and lubricants, Shoreham Hotel, Washington, D. C., February 3-8.

Missouri Petroleum Association, annual convention and trade exhibit, Jefferson Hotel, St. Louis, February 4-6.

American Petroleum Institute, Division of Marketing, lubrication-committee meeting, Hotel Book-Cadillac, Detroit, February 18-19.

Wisconsin Petroleum Association, twenty-sixth annual convention and equipment show, Milwaukee Auditorium, Milwaukee, February 26-27.

American Association of Petroleum Geologists, Rocky Mountain Section, annual meeting, Salt Lake City, February 28-29.

March

American Society for Testing Materials, spring meeting, Hotel Statler, Cleveland, March 3-7.

American Petroleum Institute, Division of Production, southwestern district, Washington-Youree Hotel, Shreveport, March 5-7.

National Association of Corrosion Engineers, eighth annual conference and exhibition, Galvez Hotel, Galveston, Tex., March 10-14.

American Institute of Chemical Engineers, regional meeting, Atlanta, March 16-19.

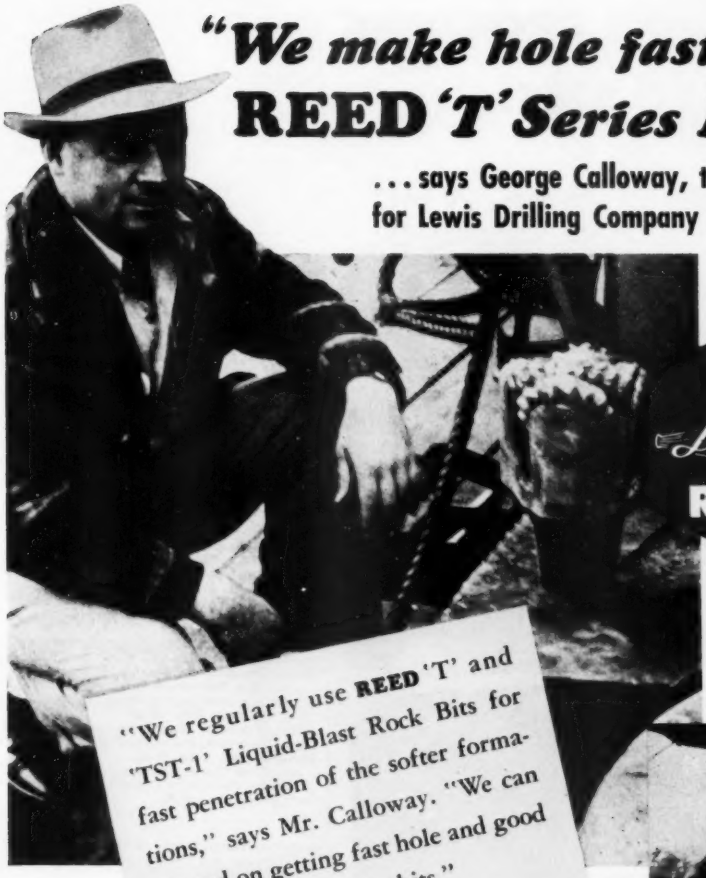
American Petroleum Institute, Division of Production, Mid-Continent district meeting, Broadview Hotel, Wichita, Kans., March 21.

American Association of Petroleum Geologists, Society of Economic Paleontologists and Mineralogists, and Society of Exploration Geophysicists, joint annual meeting, Biltmore Hotel, Los Angeles, March 23-27.

Western Petroleum Refiners Association.

"We make hole fast with REED 'T' Series Rock Bits"

. . . says George Calloway, tool pusher for Lewis Drilling Company in Kansas.



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Harold Shank, day driller for Lewis Drilling Company.

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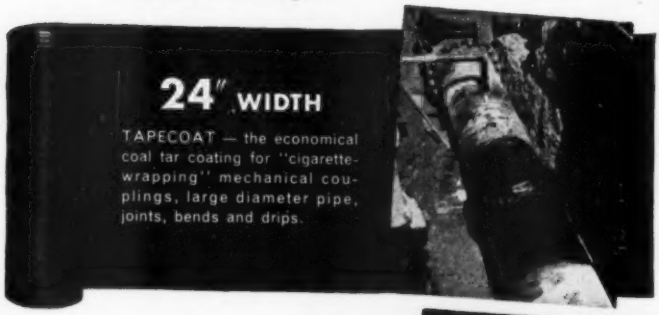

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TAPECOAT — the economical coal tar coating for "cigarette-wrapping" mechanical couplings, large diameter pipe, joints, bends and drips.

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TAPECOAT—the practical coal tar protection for "cigarette-wrapping" of large couplings, pipe bends, and joints on large diameter pipe.

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TAPECOAT — the distinctive, time-tested coal tar tape for spiral-wrapping welded field joints, service connections, pipe under streets and sidewalks, and pipe through building walls.

For more than 10 years, Tapecoat engineers have specialized in pipe joint protection. Call on them to help you meet your individual requirements. Write today for complete details.

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Originators of the Coal Tar Tape for Pipe Joint Protection

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annual meeting, Plaza Hotel, San Antonio, March 31-April 2.

April

American Petroleum Institute, Division of Production, eastern district, Hotel William Penn, Pittsburgh, April 2-4.

Southwestern Gas Measurement Short Course, University of Oklahoma, Norman, April 8-10.

American Institute of Electrical Engineers, District 7 meeting, Hotel Jefferson, St. Louis, April 15-17.

American Petroleum Institute, Division of Transportation, pipe-line conference, Blackstone Hotel, Fort Worth, April 21-23.

American Petroleum Institute, Division of Production, Rocky Mountain district, Gladstone Hotel, Casper, Wyo., April 24-25.

Southern Gas Association, annual convention, Galveston, Tex., April 28-30.

American Institute of Electrical Engineers, District 1 meeting, Binghampton, N. Y., April 30-May 2.

Natural Gasoline Association of America, annual meeting, Rice Hotel, Houston, April 30-May 3.

May

American Geophysical Union, thirty-third annual meeting, National Academy of Sciences, National Research Council, Washington, D. C., May 5-7.

American Institute of Chemical Engineers, regional meeting, French Lick, Ind., May 11-14.

American Association of Petroleum Geologists, regional meeting, Tulsa, May 12-13.

American Gas Association, Natural Gas Department, spring meeting, Biltmore Hotel, Los Angeles, May 12-13.

American Petroleum Institute, Division of Refining, seventeenth midyear meeting, San Francisco, May 12-15.

American Petroleum Institute, Division of Production, Pacific Coast district, Biltmore Hotel, Los Angeles, May 15-16.

American Petroleum Institute, Division of Marketing, midyear meeting, Copley Plaza Hotel, Boston, May 19-20.

Gas Appliance Manufacturers Association, annual meeting, Broadmoor Hotel, Colorado Springs, Colo., May 21-23.

American Gas Association, production and chemical conference, Hotel New Yorker, New York, May 26-28.

June

Pennsylvania Grade Crude Oil Association, annual meeting, Hotel William Penn, Pittsburgh, June 5-6.

Canadian Gas Association, Chateau Frontenac, Quebec, June 8-12.

American Petroleum Institute, midyear standardization meeting, Brown Palace Hotel, Denver, June 9-14.

American Society for Testing Materials, annual meeting, Hotel Statler, New York, June 23-27.

American Institute of Electrical Engineers, summer general meeting, Hotel Statler, New York City, June 23-27.

September

American Institute of Chemical Engineers, regional meeting, Palmer House, Chicago, September 11-13.

American Association of Oilwell Drilling Contractors, annual meeting, Skirvin Hotel, Oklahoma City, September 28-30.

NOMADS

Tulsa Nomads, third Friday of each month. After Five Room, Tulsa Hotel.

Dallas-Fort Worth Nomads, first Monday of each month. Greater Dallas Club.

Houston Nomads, second Monday of each month. Ye Ole College Inn, Houston.

Los Angeles Nomads, second Wednesday of each month. Jonathan Club.

New York Nomads, December 8. Christmas dinner dance, Hotel Pierre.

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Get MORE from your pumps with these long-lasting valves and seats! They have many exclusive, field-tested features, as shown by this illustration. Both valve and seat are made from high grade alloy steel forgings, precision-machined. They're fully heat treated in our new controlled atmosphere furnace—the most advanced method of heat treating known!

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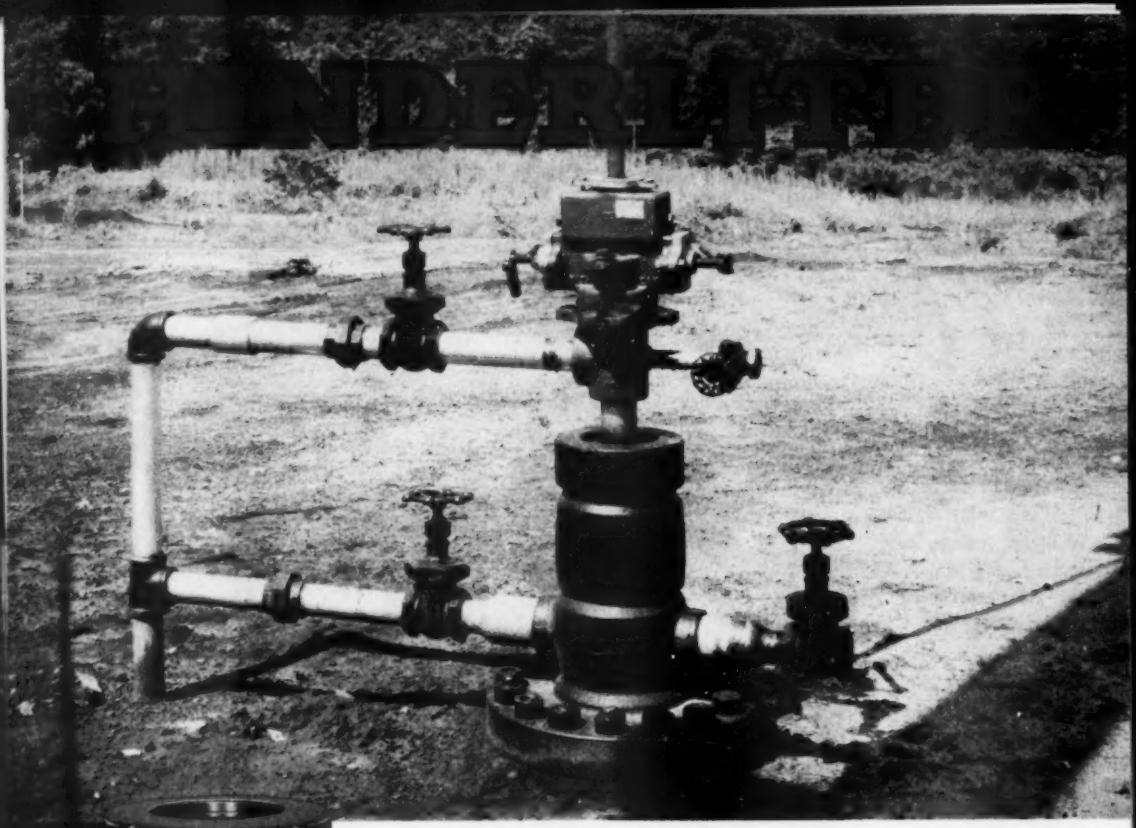

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These Heads have full opening internal bore and are tested for 4000 p.s.i. Test Pressure and available in a full range of sizes.

The Type HW Two-In-One Tubing Head is designed for use in pumping production or flowing wells, when acidizing and for repressuring projects. Well tubing may be installed by slip suspension or hanger.

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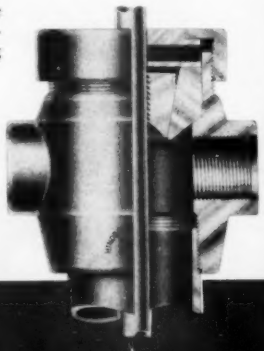

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JOURNALLY Speaking

Bird Watchers, Yet

OLD-TIME oil operators, right-of-way men, and claims attorneys will silently swear through gritted teeth at this one. The oil industry is sure getting sissy. Not content with going all-out for public relations, it is now getting awards for bird relations.

Yup, the National Audubon Society presented a "Citation of Merit" to Continental Oil Co. and Western Natural Gas Co. for not disturbing some birds' nests in the middle of their Blackjack gas field on the Texas Gulf Coast. These nests are the winter home of the 32 surviving whooping cranes, America's largest and rarest birds, described as "almost as tall as an oil man but a lot more timid."

When the companies leased the tract, bird lovers extracted a promise that they wouldn't disturb the whoopers during the nesting season. So last spring the drilling crews sat around twiddling their thumbs until the last fledgling flew off in the direction of the Arctic Circle. Not only that, but the companies rerouted a canal in order to dodge the birds' favorite area.

If this soft-heartedness spreads, how is the oil industry going to do business? Just think of the number of pipe-line right-of-way men who have made a quick exit from a farm with a load of buckshot in the seat of their pants, the lawsuits for fences damaged by drilling crews and cows killed by oil on a creek, and the claims that a seismograph shot ruined every water well and setting of eggs in half a county. And now we have roughnecks tiptoeing around as bird watchers. Tsk, tsk. No sir, times ain't what they used to be.

Rural Justice

THE incident of suspending drilling operations while whooping cranes raise their young recalls the many hours we have spent listening to oil men tell about the odd damage claims farmers have brought against oil companies for alleged injury to their property. These yarns are legion, and there would seem to be no limit to the ingenuity of farmers (or their lawyers) in conjuring up a semblance of cause-and-effect between an oil operation and practically any rural mishap.

Of course it's only prize cattle which die because some drilling well may have let a barrel of salt water get into a creek 6 miles above the pasture; and the way in which a single seismograph shot can prevent the lambing of an entire flock of sheep in the next field is a complete mystery to pathologists. But local juries are easy to convince, and the farmer's word usually wins out over expert scientific witnesses from the city.

One of the strangest class of claims is that geophysical operations ruin water wells. Geologists have spent many hours in witness chairs trying to explain that the local substrata and water tables could not possibly have been disturbed by the exploratory shot holes, but usually to little avail. One oil man of our acquaintance, who has had a lifetime of experience with such claims, says he knows of only one case where a shot hole really did cause a farmer's well to go dry. Careful examination showed that the shot hole had punctured an impervious layer beneath the water table, permitting the water to drain down into a lower sand. The company moved back in, plugged the shot hole, drilled the farmer a new well, and avoided a lawsuit.

Getting in the Act

THIS oil business is going so strong that just about everybody and his cousin is trying to get into it. We noted the other day that Midwest Plumbing & Heating Co. of Denver is drilling a wildcat well in Colorado. That outfit ought to be pretty adept at handling the pipe, anyway. And our favorite oil publication recently rejected a subscription application from a big-shot movie maker in Hollywood; the letterhead gave the man's profession as "producer," all right, but what he produces doesn't make him eligible to join our elite circle. On second thought, though, the movie industry does have some parallels with the oil industry. There are producers and distributors, the gossip columnists all have pipe lines, and the censor's office puts the product through a sort of refining process.

—Henry D. Ralph.

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Weigh the advantages of lost circulation materials and you will find that Jelflake fragmented plastic foil gives you the most value for your dollar. Because the average thickness of Jelflake is only 1/1000 of an inch, you get greater square foot coverage with each pound!

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FOR OIL INDUSTRY CHEMICAL SERVICE

the OIL AND GAS JOURNAL

November 29, 1951

VOL. 50, NO. 30

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For The First Time Paraffin Controlled From The Surface

THE days of shutdowns, rod-pulling, steaming and un-jointing of pipe to remove paraffin from rod wells, flowing wells and surface lines have passed into oblivion. This troublesome, costly practice went 'out the window' with the perfection of the Kinney Soluble Plug Injection System—a method of keeping tubing and flowlines free of paraffin through inexpensive stationary surface control.

This system is so simple, practical and economical that it has gained enthusiastic acceptance by Majors and Independents alike in the Gulf Coast, Mid-Continent, Rocky Mountain and foreign areas. To date, NOT A SINGLE KINNEY PLUG INJECTOR HAS BEEN REMOVED BECAUSE OF DISSATISFACTION!

Heart of the Kinney System is a plug injector valve through which soluble plugs may be inserted while the well's production is being bypassed through a built-in orifice. After the plug is inserted the valve is turned so that the plug is free to travel through the tubing or flowline, pushing paraffin deposits before it. The plug, being hard enough to mechanically keep the paraffin from depositing, is soluble in oil and goes into solution after it has served its purpose. It will withstand temperature up to 150 degrees without changing its shape.

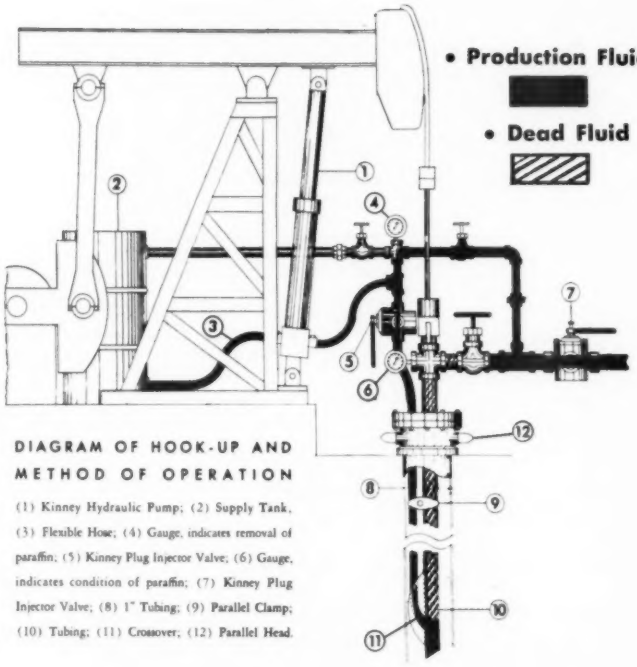


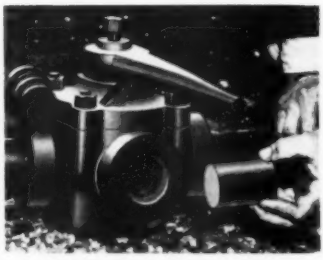
DIAGRAM OF HOOK-UP AND METHOD OF OPERATION

(1) Kinney Hydraulic Pump; (2) Supply Tank; (3) Flexible Hose; (4) Gauge, indicates removal of paraffin; (5) Kinney Plug Injector Valve; (6) Gauge, indicates condition of paraffin; (7) Kinney Plug Injector Valve; (8) 1" Tubing; (9) Parallel Clamp; (10) Tubing; (11) Crossover; (12) Parallel Head.

Pumper engaging head Kinney Hydraulic Pump to Pump Jack on major oil company well in West Texas.

As shown on the diagram, the small string of tubing is set below the point where the paraffin will accumulate. This tubing becomes the production line. The fluid in the regular production tubing above the parallel crossover becomes "dead" and does not experience any accumulation of paraffin in that area after the hookup is made. Thus the rod as well as the wall of the 2" tubing is free of paraffin.

The 2½" hydraulic pump, which is adjustable to fit any size pumping unit, is designed to operate only when injecting plugs into the well. The connecting head of the hydraulic pump is easily engaged or disengaged by merely slipping or pulling it from a slot. When the pumping pressure builds up due to the paraffin accumulation in the small production line it is reflected on gauge (Fig. 6). A Kinney soluble plug is injected in the valve (Fig. 5), the hydraulic pump (Fig. 1) is connected to the pumping unit and the plug is forced down the tubing below the paraffin line but safely above the opening of the main tubing. When the Hydraulic pump is cut off, the pressure is then reversed and the plug carried up through the tubing and out into the flowline.



Soluble Mechanical Plug being inserted in Kinney Plug injector valve.

The entire Kinney System is complete and available for easy installation. Instructions for installing are furnished and are easy to follow. Once the system is installed all that is necessary to keep the tubing and flowlines free of paraffin is to insert a soluble plug at the proper intervals. The average cost of plugs after Kinney Plug injection system is installed amounts to about $1.60 per month. Flowing wells are now being controlled by using Kinney Differential Pressure System between casing and tubing at a cost of approximately $200.00 per well and $1.60 per month for plugs.

Illustrated, informative literature, together with cost estimates will be furnished by Kinney, Inc., P. O. Box 3426, Odessa, Texas.

ADVERTISEMENT

Revolving Bureaucrats

Something is going on in the Petroleum Administration for Defense which looks like the old game of musical chairs. Officials keep resigning to go back to the oil industry while other men come from the industry to take their places. But unlike the children's game where somebody loses in every shuffle, the PAD system is a gain for all concerned.

The rotating roster of PAD is a phenomenon in government-industry relationship largely peculiar to the oil business. Other industries lend men for government service but on nothing like the same scale. All policy-making and virtually all operating positions in PAD are filled by men fresh from industry and scheduled to go back to it after a few months.

This constant parade of oil men in and out of PAD chairs brings to this temporary agency men who want to keep it temporary, men whose only ambition is to accomplish their assignments most expeditiously and work themselves out of a job. It keeps PAD staffed with men thoroughly familiar with the problems at hand, whereas it might have been manned by unqualified bureaucrats culled from other agencies, strangers to the industry and possibly bent on permanent reform in the guise of emergency regulation.

The rotation system spreads the burden among those tapped for service and their employers, and to the everlasting credit of the industry it can be said that in no case has one of these men been guilty of favoring his own company while occupying a position of public trust.

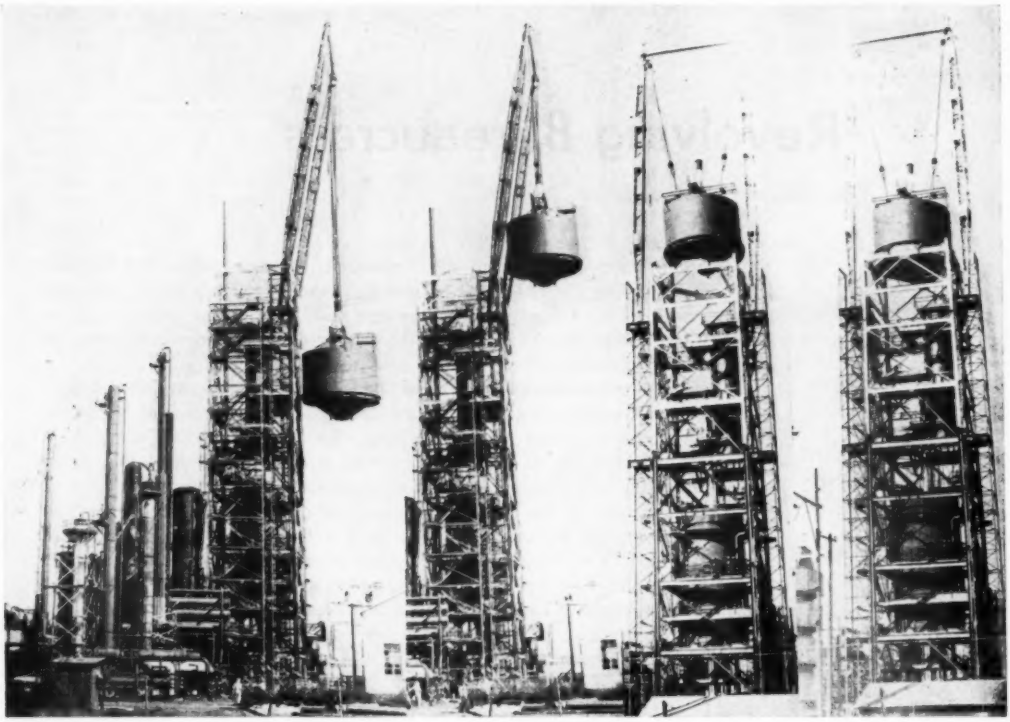
The advantages to the industry as a whole are obvious and operators large and small praise the results of this system. Yet some companies are reluctant to spare a man for the cause when their turn comes. Not only do they lose a key man for perhaps a year, but they are directly out of pocket because they usually continue to pay all or a substantial part of the man's salary during his government service.

Too frequently overlooked are the advantages which the company and the individual gain. These "temporary bureaucrats" return to their old jobs with an immensely broadened view of the industry as a whole and of government procedures and the problems of government officials. Many who felt they were being sentenced to Siberia when tapped for Washington service later confessed that the experience was extremely valuable.

In a great majority of cases these men have proved more valuable to their companies as a result of their Washington tour of duty. For proof look at those who staffed PAW during the war; almost all of them have risen rapidly in the industry and many are among its outstanding leaders today.

By all means this system of revolving bureaucrats should be continued. It means a temporary hardship on the men and their employers, but it brings both immediate benefits to the industry at large and long-range gains for the individuals and the companies who participate.

THIS WEEK



GOING UP!—The huge object being hoisted in this series of photographs is a 50-ton catalyst-storage bin, which is being placed in operating position in the new 8,000-bbl. T.C.C. unit being installed in the Wichita, Kans., refinery of Derby Oil Co. The trick photography showing the movement of the storage bin is an accomplishment of F. W. McCurry, vice president in charge of Derby's manufacturing. The entire tower, which is 250 ft. high, consists of kiln, reactor, the catalyst bin, surge tank and separator, and fresh catalyst storage. The rigging shown was developed by Fluor Corp., and it is the second time it has been used in installations of this type. The new plant is scheduled to go on stream during January of 1952.

PRODUCTION—Office of Price Administration considers Government subsidy for stripper-well production in lieu of increase in crude-oil ceiling. . . . ¶World production in September relatively steady at 11,757,000 bbl. daily, up 15,000 bbl. over August. . . . Gains in United States, other countries offset by slump in Kuwait. . . .

INTERNATIONAL—Prospects that Iranian nationalization problem will be settled through formation of new government due to internal pressure suffer setback. . . . Mossadegh gets 90-0 vote of confidence. . . . ¶Bapco to expand Bahrein refinery capacity by 35,000 bbl. daily. . . .

ACTIVITY—Crude production for week ended November 24 averaged 6,154,425 bbl. daily, up 11,275 bbl. daily. . . . ¶Well completions for the week totaled 820 compared with 896 for previous week and 809 for same week last year. . . . ¶Wildcat completions for the week were unchanged at 235 wells, up 66 from same week in 1950. . . . ¶Rotary rigs operating in United States on November 19 increased 77 rigs to set a new all-time record of 2,953. . . .

TRENDS—Distillate stocks decreased 2,258,000 bbl. for week ended November 17. . . . District 2 accounted for more than half of the decrease with a reduction of 1,173,000 bbl. . . . Districts 1 and 3 combined had a drop of 941,000 bbl. . . .

GOVERNMENT—Interior Secretary Chapman says no full-scale development of tidelands oil will be undertaken without congressional sanction. . . . ¶Interior Department rejects claims to tidelands by 11 applicants in possession of 90-year-old scrip. . . . ¶Small-business committee checking up on PAD's methods of allocating tubular goods. . . . ¶DPA grants certificates for 17 more refinery projects representing investments in excess of $137,633,000. . . . Federal appeals court asked to review FPC decision on Phillips case. . . .

PIPE LINES—Pipe now in transit from mills for Sinclair's new 675-mile crude trunk from Oklahoma to East Chicago, Ind. . . . Project is biggest modernization job ever undertaken by a big-inch crude system. . . . Involves dismantling and taking up of old 700-mile "Prairie" system and elimination of bottleneck in Drumright-Cushing, Okla., area. . . . ¶Plantation schedules dedication for new 707-mile products system for December 4. . . .

Stripper Study

They account for 68.7 per cent of all wells, produce 19 per cent of oil, Compact survey shows; subsidy talked

A GOVERNMENT subsidy for oil production from stripper wells is being considered informally by the Office of Price Stabilization in lieu of an increase in the ceiling price on crude oil.

Such a subsidy would apply to two-thirds of the oil wells of the nation and one-fifth of the country's crude production, according to a survey of stripper wells just completed by the Interstate Oil Compact Commission.

This is an annual survey and was prepared without reference to the price problem, although it originated because of price problems which arose during World War II. At that time the freeze on crude-oil prices imposed a hardship on stripper wells and eventually the Office of Price Administration subsidized stripper production. As before, the Compact's survey doubtless would serve as a guide to the administration of any subsidy proposed by OPS.

The subsidy suggestion arose recently when representatives of the Pennsylvania Grade Crude Oil Association, an important stripper area, asked OPS to lift the ceiling on Penn Grade crude and let it find its own price level. This crude normally brings a premium price because of its lubricating value. Spokesmen for stripper producers in other areas asked the same action but OPS officials countered with the suggestion for a subsidy, and the whole matter is still in the stage of informal discussion.

Basis for study.—The survey of the Compact Commission was prepared in cooperation with the Independent Petroleum Association of America and the National Stripper Well Association. It follows a pattern developed over a period of nearly a decade.

There is still no cut-and-dried, universally accepted definition of a stripper well, and the basis of the Compact's figures varies somewhat from state to state.

"In general," says the commission, "stripper wells are those which, producing at their maximum unrestricted capacity, produce oil in such a volume that the profit from their operation is insufficient to warrant additional development in these fields."

In many cases local conditions such as the quantity of water produced, depth of the well, and age of the properties warranted classification as stripper wells. The commission concluded that, in general, it can be said that two-thirds to three-quarters of the total oil that a well will produce has been produced at the time it is classified as a stripper well, although in some instances wells are classified as strippers almost from their initial production. In some states where laws specifically designate wells to be unrestricted because of depth and limitation of production, all such wells were generally classified as stripper wells.

Production.—The latest survey shows that there were 321,287 stripper wells in the United States as of January 1, 1951, which is 68.7 per cent of the 467,776 producing oil wells on that date.

During 1950 these stripper wells produced 375,551,037 bbl. of crude, or 19 per cent of the total 1950 production of 1,972,812,000 bbl. The average daily production for stripper wells in 1950 was 3.2 bbl. per well, while the average for all wells in the nation was 11.6 bbl. per well. This stripper-well oil was produced from 3,663,751 acres, which is approximately 22.5 per cent of the total productive acreage of the nation.

The commission estimated that underlying these 3,663,751 acres the total reserves still possible to be recovered are 8,813,927,000 bbl., of which 4,578,472,000 bbl. can be recovered only through the application of secondary-recovery methods of production.

Reserves.—The total reserves of liquid hydrocarbons as of January 1, 1951, have been estimated to be approximately 30,000,000,000 bbl., the report says, and adds:

"How much of the stripper-well reserves are included in this 30,000,000,000 bbl. it is extremely difficult to evaluate. However, it is of some importance that this 8,813,927,000 bbl. of reserves under stripper wells represent more than 29 per cent of the total United States reserves and it is likely that several billion barrels of this reserve are additional to that given for the national proven reserves of the United States."

Abandonment.—Of considerable importance are the survey's figures on the number of wells abandoned because they were no longer profitable at current operating costs and crude-oil prices. During 1950 a total of 9,236 oil wells were abandoned and the number of stripper wells increased by 7,317 so that 16,553 wells, which were not considered stripper wells in 1949, had either been abandoned during 1950 or had become stripper wells.

Inasmuch as 24,430 oil wells were completed during 1950, the report observed, the number of oil wells abandoned or reaching the stage of stripper classification was 67.7 per cent of the total new wells completed.

A similar comparison for the 7-year period during 1944-50 indicates that more than 68,149 wells were abandoned and 130,233 wells were completed as oil wells. During this period the total number of stripper wells increased by 24,899. The total num-

1951 NATIONAL STRIPPER-WELL SURVEY
(Thousands of barrels)

State—	No. of stripper wells	Production from stripper-well fields, 1950	Productive acres	Accumulative prod. to 1-1-51	Estimated primary reserves, 1-1-51	Est. probable secondary-recovery reserves, 1-1-51	1950 abandonments
Arkansas	2,974	8,470,290	99,205	593,813	71,894	40,841	56
California	16,076	57,085,200	133,590	3,699,687	685,924	614,000	98
Colorado	162	488,464	10,400	28,207	6,663	.....	1
Illinois	24,295	61,353,500	393,900	1,490,728	†611,162	500,000	707
Indiana	2,774	4,285,470	33,250	180,197	23,738	41,200	38
Kansas	14,811	24,792,836	284,188	1,089,795	222,614	226,243	871
Kentucky	14,781	3,769,155	71,500	41,000	51,000	26,000	450
Louisiana	4,505	9,826,021	73,914	487,600	65,715	48,300	254
Michigan	3,954	15,942,583	115,920	522,727	84,526	27,000	202
Mississippi	171	630,068	6,680	21,176	2,963	.....	19
Missouri	89	32,000	1,500	676	.....	.....	.....
Montana	2,978	4,183,826	64,735	138,048	35,402	13,500	28
Nebraska	51	584,795	2,410	6,250	799	.....	0
New Mexico	2,427	4,704,031	94,240	*122,249	502,122	74,470	17
New York	28,348	4,096,840	88,710	172,670	50,000	58,500	550
Ohio	17,587	3,313,595	151,000	621,313	27,264	10,000	1,047
Oklahoma	42,810	46,981,370	695,535	4,021,558	384,287	1,561,270	1,009
Pennsylvania	78,976	12,007,520	625,193	1,146,446	39,340	400,014	2,292
Tennessee	28	11,781	165	742	.....	.....	5
Texas, total	46,197	102,744,752	435,479	4,014,368	745,608	737,884	1,008
North Texas	17,797	16,704,225	88,985	1,046,441	131,836	263,672	547
W. C. Texas	5,912	4,848,660	23,648	162,072	47,296	82,768	246
Texas, other	22,488	81,191,867	322,846	2,805,855	566,476	411,444	215
West Virginia	14,575	2,788,606	235,750	440,945	49,212	63,000	550
Wyoming	2,718	7,458,940	46,457	480,254	575,422	116,250	34
Total	321,287	375,551,037	3,663,751	19,120,459	4,235,455	4,578,472	9,236

*Production from stripper wells only. †Reserves under present producing methods. Includes some secondary recovery.

ber of wells abandoned or becoming stripper wells was more than 92,048, or 71.4 per cent of the total number of oil wells completed during this same period.

The report pointed out that the number of stripper wells and the number of producing acres in stripper-well fields has remained relatively constant during the 9 years which have been covered by the Compact's surveys. However, the annual production from stripper wells has continued to rise in the period since 1941 and the average production per stripper well per day has risen from a low of 1.898 bbl. in 1942 to a high of 3.202 bbl. in 1950.

End of the Line

Dismantling of outdated "Prairie" system to start soon as Sinclair prepares to lay new crude trunk to Chicago

Paul Reed

INDEPENDENCE, Kans. — Sinclair Pipe Line Co. will start laying pipe soon on its 675-mile, 24 and 22-in. crude-oil trunk line from the Drumright-Cushing, Okla., area to East Chicago, Ind.

Contract for the 150-mile, 24-in. section from the southern terminus to Humboldt, Kans., has been let to O. R. Burden Construction Corp., and pipe is now in transit from the mills. As soon as enough pipe has accumulated to insure steady progress, the first construction spread will begin operations near Wayside, Kans.

Biggest modernization. — The project is the most extensive modernization job ever undertaken by a big-inch crude-oil system. It will mean dismantling and removing the 700-mile multiple-line system originally laid in 1904 and 1905 by Prairie interests. For a long time, it has been the principal trunk line from the Southwest, and it is recognized as the daddy of all trunk lines in the Mid-Continent area.

The new line will incorporate the most advanced features of modern pipe lining. The initial program calls for installation of eight electric centrifugal stations equipped for semi-automatic, push-button operation.

Communication will be by a microwave system with "legs" to existing products-line pump stations along the route of the old line which is some distance from the new line particularly in the area north of Humboldt. The legs are needed because the new line follows a shorter route.

Station location. — Sinclair's Drumright station will receive crude from Basin Pipe Line System and from the company's Manuel station. A new Cobb station will be located in the vicinity of the existing Cobb Station near Caney, Kans. Another new station will be built near the present station near Humboldt, Kans. Existing tankage at both Cobb and Humboldt will continue to be utilized. Still another station will be located at Gunn, Mo.

The line will meet with the Platte Pipe Line Co. system at Key Station, near Keysville, Mo., in the Salisbury area. A that point deliveries can be made into the Platte system for shipment to Wood River, and Wyoming crude from Platte can be forwarded to East Chicago through the Sinclair line.

A sixth station will be located near Quincy, Ill., and another near Forest City, Ill., each bearing the name of the nearby town. Flanagan Station will be near Pontiac, Ill.

Station design.—Stations will each be equipped with four units. Three of these will be two-stage units and the fourth will be one stage of approximately half the capacity.

Keynotes of station design have been simplicity and safety. Shutdown and warning devices will be used to safeguard against dangerous temperature and pressure conditions.

Station equipment will be furnished as follows: Pumps from United Iron Works, motors and electrical equipment from Allis-Chalmers Manufacturing Co., thermocouple equipment from Leeds & Northrup Co., and pressure-control equipment from Mercoid Corp. and Mason-Neilan Regulator Co.

Pipe comes from the mills of Republic Steel Corp., Western Consolidated Steel Corp., and Kaiser Steel Corp. It will be expanded X52 of 11/32-in. wall thickness. Pipe protection will be a single coating of coal-tar enamel wrapped with glass mat and kraft paper. Rock shields will be applied in rocky ground. Berms of dirt to support the pipe in the ditch will be capped by pads of rock shield. Contractor will install electrolysis-test points and specifications permit automatic welding at the contractor's option.

Dismantling program. — The dismantling program will entail removal of all existing stations north of Drumright as well as part of the Manual station at Drumright. All of these are diesel-reciprocating type.

South of Humboldt certain 8 and 12-in. lines will be continued in service to handle movements from gathering systems. North of Humboldt all existing crude-oil lines will be salvaged, including an 8-in. line which is moving segregated high-vapor-pressure crude. Altogether there are approximately 2,900 miles of 8, 10, 12, 14, 16, and 18-in. pipe along the route of the existing trunk line from Drumright to East Chicago.

Bottleneck out. — The new Sinclair big-inch will eliminate an important bottleneck in the Drumright-Cushing area. Furthermore, it will facilitate batching of different grades of crude which is impossible with the present multiple-line system now operating between Oklahoma and Chicago. Three or more grades of crude will be attached in the new system.

The big-inch project is being directed by Roy J. Tibbets, president; William H. Morris, vice president and general manager of crude-oil lines; and Earl Unruh, chief engineer for Sinclair. The project manager of line construction is J. E. McConnell, administrative assistant. Station construction will be supervised by L. B. Moon, vice president and general manager of products lines.

Expansion Plan

Ohio Standard to expand refineries at Lima, Toledo

CLEVELAND. — Standard Oil Co. (Ohio) this week announced it will begin work early next year on a $14,000,000 expansion program at its Toledo and Lima refineries

The huge program will include a $3,000,000 alkylation unit at Toledo, an $8,500,000 catalytic reforming unit at Lima, and a $2,400,000 expansion of the existing crude-coking unit at Lima.

Work will begin first on the alkylation unit, according to E. B. McConnell, vice president in charge of manufacturing. Certificates of necessity and priority ratings already have been received, he said.

Engineering and design work will begin immediately on the other two projects, with construction scheduled to begin when design work is completed and priority ratings are granted.

At present the Toledo refinery has a crude-cracking capacity of 21,000 bbl. per day, with thermal cracking capacity of 30,500 bbl. per day. The Lima refinery now has a crude-charging capacity of 30,500 bbl. and thermal cracking capacity of 25,500 bbl. per day.

An Ohio Standard announcement said the catalytic reforming unit at Lima will be the first of its kind ever build and will employ a chromia-alumina catalyst developed in the company's Cleveland research and development center.

The expansion program planned for Lima follows completion last year of a $30,000,000 program at the refinery. This expansion program included installation of a catalytic cracking unit and lubricating-oil facilities.

Power Pumping

Advantages of electricity cited at P.E.P.A. meeting

HOUSTON.—Under normal operating conditions, use of electric power has distinct advantages in oil-well pumping, A. S. Ross, vice president of Caddo Oil Co., told the Petroleum Electric Power Association here last week.

Advantages cited were the cheapness of electric power, ease of maintenance of electric-powered installations, safety to personnel and equipment provided, and the fact that equipment life is longer when powered with electricity.

Ross said experience of his company has shown that a pumper required to service 10 to 20 gasoline-powered wells could, in general, take care of 30 to 50 electrified wells. He presented figures to show that the cost of operating pumping wells which had been converted from gasoline engines to electric motors had been reduced considerably. In one case, he said, the average cost of pumping 315 wells in 1941-43 was 20 per cent higher than present costs, after conversion to electric power, in spite of increased operating expenses during the past several years.

Other advantages of electric power, Ross declared, arise from the fact that electric motors deliver both uniform power and easily varied power. Thus, equipment life is prolonged because of the smoothness of flow of power, he said. The easy control of the motor's speed assists in achieving maximum efficiency by facilitating adjustments such as rate of pump stroke, pump stroke length, and counterbalance.

Industry Briefs

HOUSTON. — Woodley Petroleum Co. has completed the first producing oil well for Grimes County, Texas. It is located in Wesley Fisher Survey about 10 miles from nearest established production. Potential showed 21.39 bbl. of 35°-gravity oil on 24-hour test through 12/64-in. choke with tubing pressure of 1,550 psi. Production is from Wilcox at 4,688-92 ft.

McKITTRICK, Calif. — Return to production of Papco lease near here after it had been shut in since 1920 may start a wave of remedial work on other idle wells and leases in this area. Revival of Papco is credited to Ralph A. McGoey, Bakersfield, Calif., consultant, who recently leased the 20-acre parcel from Richfield Oil Corp. to 1,500 ft. McGoey cleaned out Papco 5 and returned it to production for 35 bbl. of 14.6°-gravity oil daily.

LONG BEACH, Calif. — Considerable opposition is building up to The Texas Co.'s proposed drilling of a triangular-shaped area in this city. The fight with property owners and city-improvement associations is expected to come to a head December 4 at a hearing by the city council on the company's drilling petition.

COLES VALLEY, Ore.—Union Oil Co. of California has bought a majority interest in Oil Developers, Inc., which is drilling a well near here in an effort to establish the first oil production in the state. Under the agreement, Oil Developers will maintain an undisclosed percentage of any oil discovered. Union will finance drilling operations retroactive to November 1 and carry on further exploration if it considers prospects good.

WASHINGTON.—An order limiting production of home and farm metal tanks for the storage of petroleum products during the first half of 1952 to 50 per cent of the 1950 base-period production is being written in the National Production Authority. The order is being drawn up due to the critical shortage of steel expected to be experienced during the next 6 or 7 months.

SPRINGFIELD. — Drilling permits issued this year in Illinois are running well below the number issued in 1950. The oil and gas division of the state's Department of Mines and Minerals last week announced that 2,473 oil-well drilling permits had been issued through October of this year, compared with a total of 2,755 issued during the first 10 months of 1950.

WASHINGTON.—The National Production Authority has been urged by fabricated metal-pipe manufacturers to induce refiners and other users of piping to accept welded instead of seamless pipe, wherever possible, to ease the heavy demands on seamless mills.

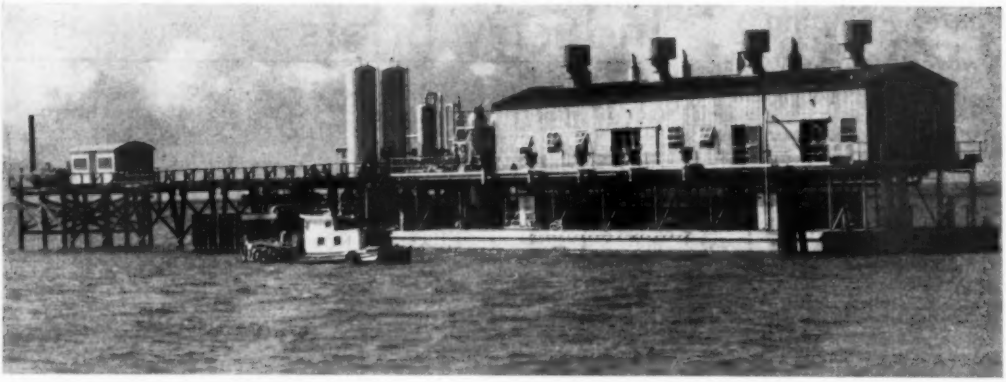
LOS ANGELES. — The old Petrol Corp. refinery in eastern Los Angeles, now owned by Standard Oil Co. of California, is being dismantled. Much of the tankage is being salvaged for shipment to plants of American Bitumuls Co. at Salisbury, N. C., and Oronite Chemical Co. near New Orleans, both subsidiary companies of California Standard.

WASHINGTON.—Samuel H. Crosby, Washington attorney and former Federal Power Commission trial examiner who from 1944 to 1949 was connected with E. Holley Poe & Associates as Washington counselor, has been appointed a hearing commissioner for the National Production Authority, to preside at public inquiries into charges of violation of NPA orders and regulations.

WASHINGTON.—The National Production Authority has announced it will be able to allocate materials for the production of only 2,000 of the 2,500 tank cars programed for the first quarter of 1952. Some of the deficiency, it is believed, may be made up by using materials from inventories and by conservation and substitution.

BEAUMONT. — An all-time safety record has been set by the 3,000 employes of the Magnolia Petroleum Co. refinery here, who last week ended 159 days without a disabling injury.

NEW OFFICERS.—Heading activities of the Petroleum Electric Power Association for 1952 are the three men above. Left to right are T. E. Graham, Oklahoma Gas & Electric Co., Oklahoma City, president; J. E. Moody, Southwestern Gas & Electric Co., Shreveport, secretary-treasurer; and Ned W. Beaudreau, Central Power & Light Co., vice president.



Water-Bound Compressor Station

Shown here is one of the three new "seagoing" compressor stations which handle gas for the new 93-mile pipe line connecting four coastal gas fields with the New Orleans industrial area. The stations, floated into position and sunk, dehydrate and increase pressure of gas collected in Grand Bay, Venice, West Bay, and Quarantine fields. The stations were built for Gulf Refining Co., which spearheaded the project to utilize low-pressure gas from the coastal oil fields which formerly had been flared. Gulf engineers designed the floating compressor stations, which were built in Beaumont by Bethlehem Steel Co. Each station processes about 15,000,000 cu. ft. per day. The 16-in. line to New Orleans was laid by United Gas Pipe Line Co. at a cost of about $14,500,000. Work is scheduled to begin soon on an 8-in. lateral to connect Lake Hermitage field with the system. Firms participating in the project besides Gulf include The Texas Co., William Helis, Tide Water Associated Oil Co., and Humble Oil & Refining Co.

Celanese Enters Oil Industry

CORPUS CHRISTI.—Celanese Corp. of America has entered the oil industry through creation of a new subsidiary, Petrocel Corp.

Petrocel, which has opened geological offices here, is an exploration and development company. A Celanese Corp. announcement said it was formed as a step in a long-range program to augment the parent company's supply of oil and gas used as raw materials in its chemical, textile, and plastics operations.

Celanese now operates a chemicals plant at Bishop, Tex., and is building another at Pampa.

Three Drilling Firms Balk

WASHINGTON.—Only three firms, all relatively small, have so far refused permission for the Petroleum Administration for Defense to publish data on their drilling programs and inventories of tubular goods.

A telegraphic request for permission to print such information was sent out last week to the larger producers *(The Oil and Gas Journal, November 22, page 46)*. PAD originally estimated that there were 153 "Class B" operators, those historically drilling 40 or more wells per year, but found there were actually 181.

So far, 142 replies have been received, 113 of them giving flat permission for publication of the figures, and 26 giving conditional approval to the plan. Most of the conditions were of minor importance and will easily be reconciled, so that the data can be tabulated.

PAD is hopeful that the three companies so far refusing will change their minds when given more details of what is contemplated. The 39 companies not yet heard from are expected to make their position known by the end of this week.

Phenol Plant Contracted

MONTREAL.—B. A. Shawinigan, Ltd., a new company jointly owned by British American Oil Co. and Shawinigan Chemicals, Ltd., has awarded a contract for a phenol plant at Montreal to Canadian Kellogg Co., Ltd., a subsidiary of M. W. Kellogg Co.

According to Kellogg, the new plant, which will produce 13,000,000 lb. of phenol annually, will be the first commercial unit of its type. It will employ a process under license from Hercules Powder Co., and Distillers, Ltd., London, by which cumene is oxidized to produce both phenol and acetone. Cumene will be piped from the British American refinery at Montreal.

Tanker Turbine Successful

The world's first merchant ship powered by a gas turbine is now on regular runs as a member of tanker fleet of the Shell Group.

The 12,000-ton tanker Auris recently completed successful sea trials in the Caribbean after the turbine was installed to replace one of four diesel-electric engines which previously powered the vessel.

A Shell announcement said advantages of the turbine are less weight, smaller space requirement, less risk of failure, and lower cost of both operation and maintenance. The turbine has only two moving parts.

The Auris was built in England to a special design to permit experimentation in cargo-handling facilities, engines, and innovations in marine design.

Exploration Stepped Up

REGINA, Sask.—Geophysical exploration in Saskatchewan reached a new peak last week.

A new crew sent into the field during the week by General Geophysical Co. for Shell Oil Co. sent the total of such parties now operating in the province to 45. Previously, the record number of crews had been 44.

Discovery Percentage Slips

AUSTIN.—A few more fields have been discovered to date in Texas over last year's record, but the percentage-wise measure of successful exploration is not so favorable.

According to the Texas Railroad Commission, 2,970 dry holes have been drilled through the middle of November to find 492 new fields. Last year, 2,135 dry holes were drilled during the same period to find 489 fields.

There has been no break in the decline in oil-well completions started a month ago. The week of November 17 showed 170 completions, compared with the earlier high of 285 completed wells.

Tidelands Assurance

Chapman says no full-scale development of offshore oil resources will be undertaken without Congress' sanction

WASHINGTON.—No full-scale development of tidelands oil and gas resources will be undertaken by the Interior Department without congressional sanction.

This was indicated by Secretary Oscar L. Chapman in a placatory answer to a sharp telegram from Sen. Tom Connally of Texas.

In that telegram, bristling with such terms as "usurpation of authority," "tragic invasion of the rights of Congress," "confiscation of the oil properties without due process of law," and "unprecedented and unmitigated defiance of the Congress and the people," Connally warned Chapman that any taking over of tidelands oil by executive order or otherwise "would be official misconduct subject to action of Congress and would probably involve impeachment proceedings against officers assuming to act without authority."

Chapman asserted that administrative jurisdiction over the submerged Gulf lands was vested in the department by a presidential directive last December 11, following the Supreme Court decision in the Texas and Louisiana cases, but has so far been applied only for the conservation and protection of the oil and gas deposits.

Beyond scope.—"It is conceded by all responsible officials of the executive branch that the inauguration of a program for the full-scale development of these oil and gas deposits would be beyond the scope of the inherent power of the executive branch to act for the protection and conservation of the property, and that it would be undertaken only if statutory authority for such a program could be found in existing legislation or obtained from the Congress in the form of new legislation," Chapman continued.

"Thus, there has never been any disposition upon the part of any responsible official of the executive branch to act without statutory authority in embarking upon a program of full-scale development respecting the oil and gas deposits in the submerged lands of the Continental Shelf beneath the Gulf of Mexico."

Regardless of whether existing laws would support the issuance of oil and gas leases in the submerged lands, Chapman told the senator, Congress ought to legislate expressly with respect to this problem "by giving the executive branch specific guidance on the complicated problems that arise in this field, such as the extent to which persons who obtained from coastal states oil and gas leases on submerged lands of the Continental Shelf have equities that ought to be recognized by the federal government, and the extent to which the coastal states have equities that entitle them to share in the proceeds derived from oil and gas operations in the Continental Shelf adjacent to their shores."

Method examined.—Chapman admitted that he has canvassed all possible avenues by which the department might take over management of the tidelands. None of the laws prescribing the powers of the secretary or the department, however, could be utilized for that purpose. A survey has been made of the statutory powers of officials and agencies outside the department but "no decision to proceed under any existing provision of law has been made as yet."

"This problem is of urgent national importance," he told Connally, "because of the need for a rapid and substantial expansion of oil production in the present era of international tension. The latest government statistics on the estimated demand for and production of oil in the United States during the year 1951 indicate that the total demand during 1951 will average approximately 7,490,000 bbl. per day, whereas the total production during 1951 will average only approximately 6,702,000 bbl. per day, or approximately 788,000 bbl. per day less than the total demand," Chapman said.

"If, despite all efforts for peace, Communist aggression or some explosive situation in international affairs should result in further armed conflict, the nation's demand for oil would increase greatly over the estimated figure given above, and, in addition, such a conflict might deprive the United States of some of the sources of foreign oil with which the nation is now bridging the gap between the production of and the demand for oil.

"Therefore, it is of the utmost importance that the oil and gas deposits in the submerged lands of the Continental Shelf beneath the Gulf of Mexico, which are national defense assets belonging to all the people of the United States, shall be rapidly and extensively developed as part of the national-defense effort in the present period of international tension, if the provisions of existing legislation can appropriately be used for the purpose, or if express legislative authority for such development can be obtained from the Congress."

Scrip Squelched

Interior Department rejects claims to oil tidelands filed by 11 applicants on basis of 90-year-old land-grant paper

WASHINGTON.—An effort to take from the Government valuable submerged oil properties in the tidelands which it, in turn, is attempting to take from the states, has been squelched by Interior Secretary Oscar L. Chapman.

Acting on a 14-page opinion by Interior Department Solicitor Mastin G. White, Chapman rejected applications filed between August 8, 1946, and May 12, 1951, to select areas ranging from 40 to 1,932 acres in the offshore lands on the basis of scrip issued by the Government as far back as 90-odd years ago.

Previous efforts made to secure title to offshore tidelands through the use of scrip already had been rejected by the department. This latest decision allays fears, never very substantial, that there has been any change in the department's opinion that the tidelands do not fit under any of the laws under which scrip was issued to encourage homesteading on the public lands and facilitate exchanges of land.

The department's decision covered 11 applicants, 2 seeking lands along the Texas coast, 1 off Louisiana, and the remainder off California. The applicants were E. L. Cord, former automobile manufacturer, Los Angeles; R. F. Betz, Indianapolis; Kenneth D. McMillan, San Marino, Calif.; Balboa Development Co., Carson City, Nev.; Huntington Beach, Calif.; Los Angeles Flood Control District; Orange County, California; Santa Barbara Rodeo Co., Beverly Hills,, Calif.; Santa Barbara, Calif.; Santa Monica Wilshire Co.; and Beverly Hills, Calif.

Bases for judgment.—In his opinion, White noted that all of the lands sought by the several applicants were seaward of the line of ordinary low tide whereas, he said, the various issues of scrip cover only "public lands" which, as defined in the federal

land laws, do not include land lying seaward of the line of high tide along the coast, and that definition has been upheld by the Supreme Court.

For that reason alone, White held, the applications must be rejected, but there are other and equally compelling reasons for rejection. Even if the definition of public lands is ignored, he said, the applications would have to be denied under Executive Order 9633 in which President Truman claimed federal ownership of the Continental Shelf and ordered them "reserved, set aside, and placed under the jurisdiction and control of the Secretary of the Interior for administrative purposes, pending the enactment of legislation in regard thereto."

White pointed out, also, that most of the areas involved in the scrip applications were known at the time of application to be valuable oil properties, while the laws under which the scrip was issued directly or by implication limit land selections to nonmineral lands.

Other points noted in the opinion were that the lands applied for have never been surveyed and are not subject to being surveyed. They could not be selected under provisions of law limiting selections to surveyed lands or land subject to survey. In addition, a number of the areas applied for already were occupied under claims of right by other persons engaged in the production of oil and therefore were not "vacant," "unoccupied," or "unappropriated" as also required by law.

"It seems unnecessary, however," White said, "to extend the discussion, because it is already clear that, for reasons previously given, the department must reject all the pending applications."

PAD Under Study

Small-Business Committee thinks it ought to look into method of allocating tubular goods; hearings scheduled

WASHINGTON.—Allotments of tubular goods to the smaller producers by the Petroleum Administration for Defense are being investigated by the House Small Business Committee and will be aired at hearings scheduled by Chairman Wright Patman of Texas for early next year.

Patman's decision to go into the question of allotments was based on complaints filed with the committee that many operators found it necessary to go into the "gray market," where they had to pay as much as twice the regular commercial price, to secure tubular goods to carry on their operations.

While the hearings will be devoted principally to exploring the manner in which PAD is distributing the oil-country tubular goods allocated by the Defense Production Administration, Patman said they also would go into the question whether DPA has provided sufficient steel to PAD to meet defense needs.

Basis for the latter inquiry is the action of DPA in cutting the allocation, which was 1,800,000 tons or approximately 84 per cent of the amount requested for the current quarter, to 1,708,000 tons, or 78 per cent of PAD's claim, for the first quarter of 1952.

Staff limited.—A major complaint of the similar producers appears to be that PAD has not published any information as to the distribution of tubular goods between individual operators.

PAD's answer has been that while it could compile figures on the 153 so-called Class B operators, who drill 40 or more wells a year, and it is now seeking their permission to make public the figures on programs, allotments and inventories, it has neither the money, staff, nor space to work out the individual figures for some 3,000 small operators.

Agreeing that such a compilation might be a big job, Patman expressed the opinion that such data should be readily available to PAD in connection with its regular work of making allocations. Otherwise, he said, it is difficult to see how PAD could make allocations upon a realistic and equitable basis.

The matter was discussed in an exchange of letters between Patman and Interior Secretary Oscar L. Chapman in which the congressman charged that operators and others have been unable to find out to whom tubular goods have been allotted.

Since the production allowable of any well is a matter of public record, as are also the issuance of drilling permits, whether a well produces, ownership of any piece of property, and other data regarding producers and their activities, Patman said, "the only secret in the whole process is who gets the pipe."

Information requested.—Patman asked Chapman to make available to the committee a mass of information, including the following:

1. Total steel allotted by NPA to PAD for oil-industry tubular goods, by quarters.

2. The formula and standards used by PAD in allocating tubular goods to individual operators.

3. A tabulation of applications, by quarters, for oil-country tubular goods including the amount requested by each operator and the amount allotted, both on primary and supplemental applications.

4. A tabulation of the total wells drilled by each operator for the year 1950 and the first two quarters of 1951.

5. A tabulation of the total footage drilled by each operator for the year 1950 and the first two quarters of 1951, "including any correction in footage pursuant to which oil-country tubular goods have been allotted and corrected."

6. A tabulation of the total tonnage used by each operator as reported to PAD in 1950 and the first two quarters of 1951.

Chapman's reply.—In his response, Chapman said "it has been my impression that PAD's distribution of oil-country tubular goods had been accepted with considerable confidence by all segments of the oil producing industry" and that evidence of this sentiment was given in resolutions adopted last month at the annual meeting of the Independent Petroleum Association of America which he feels "fairly represented the consensus of the small-business segments of oil production."

The standards by which PAD evaluates applications and makes allotments of tubular goods, Chapman explained, were adopted by PAD last month only after their review by the representatives of 14 industry associations.

There has been no "secrecy policy" in PAD with respect to these standards, the secretary said, but it was felt undesirable to make them public "until they had been tested and found workable." The full text of the standards was released this month.

Chapman urged that in the event the Small Business Committee holds hearings on allotments it call some or all of the association representatives who passed on the standards "for their views on the fairness and equity of the plan and the results."

Advisory group.—The group which was called in to advise PAD on this matter included James V. Boxell, Calvert Drilling, Inc., Olney, Ill., for the Illinois Oil and Gas Association; J. S. Ewing, Dallas, Mid-Continent Oil & Gas Association, R. E. Foss, Sunray Oil Corp., Los Angeles, Western Oil and Gas Association; Stark Fox, Los Angeles, Oil Producers Agency of California; Ernest M. Funkhouser, Woodley Petroleum Co., Abilene, Tex., West Texas Oil and Gas Association.

E. L. Green, Jr., Amarillo, Tex., Panhandle Producers and Royalty Owners Association; J. P. Jones, Bradford, Pa., Pennsylvania Grade Crude Oil Association; Ross Phar, Skiles Oil Corp., Mount Carmel, Ill., Independent Producers and Land Owners Association; Fred Sehman,

Wichita Falls, Tex., North Texas Oil and Gas Association; Richard S. Shannon, Jr., Pioneer Oil Corp., Denver, Rocky Mountain Oil and Gas Association.

J. Ed Warren, King, Warren & Dye, Midland, Tex., Independent Petroleum Association of America; J. V. Wicklund, J. V. Wicklund Development Co., Detroit, Michigan Oil and Gas Association; Jack Woodward, Dallas, Texas Independent Producers and Royalty Owners Association, and F. Randolph Yost, Stanolind Oil and Gas Co., Tulsa, American Petroleum Institute.

PAD Changes

Eight assigned new jobs in key government oil agency

WASHINGTON. — A number of changes in the personnel of its materials divisions have been announced by the Petroleum Administration for Defense.

Hugh R. Lambreth of Tulsa, sales manager of the Joseph A. Coy Co. until he joined PAD last May, has been promoted from chief of the natural gasoline and gas materials branch to assistant director of the materials division in charge of domestic materials. He will be succeeded by Herman J. Herzog, head of a Chicago real estate valuation and industrial reporting firm, as acting chief.

George W. Knight of Houston, formerly with Arabian American Oil Co. at Dhahran, Saudi Arabia, and since August 1950 Washington representative of Continental Oil Co., has been named assistant director of the materials division in charge of foreign materials, and Herbert R. Hansen of San Marino, Cal., who has been assistant director of the division since last February, will be assistant director in charge of administrative matters.

Harold R. Walters of Baton Rouge, La., administrative assistant to the vice president and assistant secretary of Esso Standard Oil Co., has been named special assistant to Richard M. Morrison, director of the division, to handle materials problems in connection with line pipe supply.

William E. Tyler, since June 1950 field superintendent and assistant resident manager at La Plata, Argentina, for Kellogg Pan American Corp., has been appointed chief of the projects branch, succeeding Lloyd O. Zapp who has returned to his position with Humble Oil & Refining Co., Houston.

Jerome P. DeSale, production engineer for the Schlumberger Well Surveying Corp. at Houston prior to joining PAD last February as acting chief of the equipment manufacturers branch, has been named chief of the branch, and William R. Gottshall, formerly with Continental Supply Co. at Dallas, has been promoted from assistant chief of the production ma-

WATCHING WASHINGTON

Bertram F. Linz

No Help Here

Iran needs $120,000,000 over the next 12 months to offset the loss of revenue from oil, but there is little indication that the United States will furnish the money for Prime Minister Mossadegh to continue to resist any sort of rational agreement with Britain.

On the contrary, it is understood that Mossadegh was told, in diplomatic terms, that he would get no money in this country beyond the $8,750,000 provided by the International Monetary Fund so long as an alternative source of revenue is available through settlement of the oil controversy.

Washington officials are not unduly sympathetic toward Mossadegh's plea for financial support, feeling that to bail him out now would, in effect, be taking his side in the dispute with Britain and nullify their consistent effort to secure a settlement fair to both countries.

Support of Iran against the British also would be considered in other Arab countries as tacit approval of Egypt's effort to oust the British from the Suez Canal and the Sudan and might spark a blast of nationalism throughout entire Middle East with repercussions dangerous to our own oil companies and our national interests.

The general view in Washington is that Mossadegh maneuvered himself into a position from which he must retreat if Iran is to be kept solvent.

Truce in Korea

A truce in Korea will make little or no difference in our national oil program.

Aviation -gasoline consumption in the Korean air war is relatively light, a matter of a few thousand barrels a day. How much it would be reduced by cessation of fighting is problematical, since a considerable amount of flying would, of course, continue. Similarly, consumption of other products such as motor gasoline and bunker fuel, would be diminished relatively slightly. All this was demonstrated at the end of the last war, when military consumption continued only slightly modified for many months.

Against this are the factors that the military has a program of world-wide storage which could be built up if fighting ceased. Also, our rearmament program now calls for 143 air units to be developed over the next 18 to 24 months.

The crux of the situation is that the United States is arming itself against the possibility of all-out war. So long as we are in this preparedness era there can be no substantial change in the program for expansion of oil production. Only when we have reached the stage where we are adequately armed for war with Russia or if a state of real peace is developed will it be possible for the military to cut back on their requirements.

By that time, as at the end of World War II, the civilian economy may be in a position where it absorbs all the additional supplies made available by military cutbacks.

Backdoor Tribute

When it comes to the discussion of oil matters, the big difference between the Petroleum Administration for Defense and some of the other emergency agencies is that PAD usually knows what it is talking about.

That difference is excellently illustrated by a release issued by the National Production Authority following a recent advisory-committee meeting.

"If Iran's petroleum products are lost to the U. S., benzene, vital to the production of synthetic detergents, will have to be diverted from that use to the nation's aviation-gasoline-production program," NPA declared solemnly.

There are only two points on which one can quarrel with the NPA release, but these are rather important. First, there is no "if" about the loss of Iranian oil; second, no benzene is currently being used in the production of aviation gasoline.

Just to drive its point home, NPA emphasized the need for continued imports of benzene from Iran, although the records show we never made any such imports.

Apparently, what NPA was attempting to say was that, with the loss of Iranian oil, some of the European countries were extending their motor-fuel supplies through use of their own benzene, some of which has been coming to this country.

Someone should tell NPA that the world has now been getting along without Iran for several months. It's a tribute to the oil industry that NPA never noticed the difference.

terials branch to acting chief, succeeding Charles L. Gillespie, who has resigned to return to the Republic Supply Co. at Houston.

Conversion Steel

Purchases must be applied against 1952 allocations

WASHINGTON.—Controls over oil and gas producers' tubular-goods supplies will be tightened January 1 by a requirement that operators purchasing tubular goods produced from conversion steel must apply such purchases against their regular first-quarter allotments from the Petroleum Administration for Defense.

Heretofore there have been no restrictions on the use of conversion steel, and PAD has encouraged operators to use it to pad out their authorized allotments by not charging it against those allotments.

Conversion steel now has been included by the Defense Production Administration in PAD's allocation of steel for oil-country tubular-goods production during the first quarter of 1952, making it necessary to secure PAD authorization for the use of such material.

More expensive.—While pipe made from conversion steel normally is more expensive than conventionally fabricated pipe because of added production, transportation, and handling costs, many operators find it advantageous to buy because they can get sizes 5½-in. o.d. and smaller needed to round out their inventories.

A number of manufacturers have reported conversion space available for the first quarter, it was disclosed by Deputy Administrator Bruce K. Brown, and it is estimated they can accept new orders for about 45,000 tons of finished tubular products from conversion steel.

The new requirement that PAD authorization be secured for the purchase of either conventionally fabricated tubular goods or pipe made from conversion steel will not restrict operators' activities, and allotments may be used to purchase either type of material, PAD said.

PAD-DPA Oil Agreement?

WASHINGTON. — Petroleum Administration for Defense officials are hopeful that an agreement may be reached with the Defense Production Administration before the end of the year permitting the long-range programing of oil and gas expansion.

Now being discussed by top officials, such a policy would enable PAD to set up its programs on a 12-month basis with assurance of a steady flow of materials to carry them out.

Forced now to make its plans on a quarterly basis because of the uncertainties of the materials situation, PAD is having difficulty in firming up its plans, and that difficulty, of course, flows along into the industry.

The long-range programs which PAD would like to develop would be based on what the industry says it would do and finance, balanced against the agency's own estimates of requirements, the availability of drilling rigs and tubular goods, and the ability to build refineries.

All of the necessary information is already available in PAD and, given assurance of materials, it would be relatively simple to work out long-range programs. Officials are confident that they will get that assurance, basing their belief on the general expectation that there will be more steel and other materials available next year.

More Facilities

DPA o.k.'s $137,633,000 in new refining projects

WASHINGTON. — Seventeen more refinery projects representing investments in excess of $137,633,000 have been granted certificates of accelerated amortization by the Defense Production Administration.

Nearly $110,000,000 of the total is covered by 4 multimillion dollar projects, as follows:

1. A $34,400,000 gasoline refinery to be built by Sinclair Refining Co. at Hartford, Ill., granted 90 per cent amortization on $5,060,000, 65 per cent on $16,705,000, 45 per cent on $11,680,000, and 15 per cent on $175,000.

2. A $30,000,000 expansion of gasoline facilities by Shell Oil Co. at Norco, La., granted 90 per cent on $1,200,000, 65 per cent on $14,330,000, 45 per cent on $12,665,000, and 15 per cent on $985,000.

3. A $26,650,000 aviation-gasoline plant to be built by Cities Service Refining Co. at Lake Charles, La., granted 80 per cent on $1,650,000, 65 per cent on $18,430,000, and 45 per cent on $6,570,000.

4. An $18,805,000 motor-fuel plant to be built by Phillips Oil Co. at Sweeny, Tex., granted 90 per cent on $5,600,000, 65 per cent on $3,200,000, 45 per cent on $9,749,000, and 15 per cent on $80,000.

Other large projects include a $7,666,160 gasoline plant to be built by Sunray Oil Corp. in Scurry County, Texas, 65 per cent of $7,654,460; a $4,150,000 alkylation plant to be built by Standard Oil Co. (Ohio) at Toledo, given 90 per cent on $2,910,000 and 45 per cent on $1,240,000; a $3,910,000 isobutane plant by Cities Service Oil Co. near Blackwell, Okla., given 65 per cent on $3,880,000; a $3,755,000 benzene, toluene plant by Taylor Refining Co. near Corpus Christi, Tex., granted 90 per cent on $1,052,000, 65 per cent on $2,173,000, and 40 per cent on $530,000; and a $3,214,000 sulfuric acid plant to be built at Philadelphia by Atlantic Refining Co., given 70 per cent amortization.

Also certified were a $3,000,000 aviation-gasoline plant to be built at Long Beach, Calif., by Hancock Oil Co., 90 per cent on $2,077,740 and 45 per cent on $922,260; another aviation-gasoline plant to cost $1,022,650 by Panoma Corp. in Carson County, Texas, 90 per cent on $68,200, 65 per cent on $911,870, and 40 per cent on $42,580; a $184,125 plant for tetraethyl lead by Ethyl Corp. at Edgemoor, Del., 90 per cent. Isopentane facilities costing $43,880 by Warren Petroleum Corp. at Crossville, Ill., 90 per cent on $40,350; gasoline-production facilities by Phillips Petroleum Co. in Gray County, Texas, granted 40 per cent on $409,612, other facilities costing $173,296 in Ector County, Texas, granted 65 per cent on $130,655 and 40 per cent on $27,826. Gasoline facilities costing $184,125 at Wilmington, Calif., by Ethyl Corp., 90 per cent; gasoline facilities costing $29,815 to be built by Phillips Petroleum Co. in Lea County, New Mexico, 65 per cent on $27,150; and $275,000 facilities for storage, sale, and distribution of fuel oil and petroleum products for military use to be built at Port Newark, N. J., by Coastal Oil Co., granted 40 per cent.

New Defense Orders

WASHINGTON.—The following orders have been issued by the defense agencies:

National Production Authority

M-89, November 19: Relating to the maintenance of reasonable inventories of controlled materials by retailers.

Amendment to M-79, November 19: Revising regulations with respect to certain items of maintenance, repair, and operating supplies for export.

Directive 1 to M-16, November 19: Permitting brass and bronze foundries and wire and brass mills to obtain supplies of copper raw material in advance of receipt of monthly allocations.

Delegation 15, November 20: Giving the Secretary of the Interior authority to administer NPA Order M-87 covering MRO supplies for the solid-fuels industry.

Amendment to M-9, November 23: Restricting the quantity of slab zinc which may be purchased monthly on smaller-size orders without specific NPA authorization, effective January 1, 1952.

Office of Price Stabilization

SR 4 to CPR 17, November 20: Fixing dollars-and-cents prices for heating oils in the Boston area.

Heating-Oil Prices Set

WASHINGTON. — Specific dollars-and-cents prices for heating oils in the Greater Boston area have been established by the Office of Price

Stabilization in Supplementary Regulation 4 to Ceiling Price Regulation 17, covering petroleum products at wholesale.

The supplementary regulation applies to range oil, No. 1 fuel oil, kerosine, and Nos. 2, 3, and 4 distillate fuel oil at refineries, terminals, jobbers' barge terminals and bulk plants, and delivered in tank wagons.

Phillips Review Asked

Federal appeals court requested to consider ruling of FPC that it lacks power to regulate company operations

WASHINGTON.—A court review of the Federal Power Commission's order holding that Phillips Petroleum Co. is not subject to regulation under the Natural Gas Act has been asked by the cities of Detroit, Kansas City, and Milwaukee and the State of Wisconsin and the Wisconsin Public Service Commission.

In four independent petitions filed with the District of Columbia Federal Court of Appeals the main emphasis is upon allegedly excessive prices charged for gas by the company, but the commission's findings are challenged and the contention is made that Phillips is a natural-gas company as defined in the act.

Basis of request.—In their petition, filed jointly, the State of Wisconsin and the Wisconsin Public Service Commission contended that the sales of natural gas on which the proceedings centered were not part of production or gathering within the meaning of the act and therefore the commission erred in holding the company exempt from regulation.

It was also charged that the commission erred in limiting the issue to the so-called jurisdictional issue.

Considerable emphasis was laid on the charge the commission erred in determining that the company's sales to the five pipe line companies are so closely connected with the local incidents of production or gathering as to render rate regulation by it inconsistent with or a substantial interference with the exercise by the states of Oklahoma, Texas, and New Mexico of their regulatory functions.

"If FPC regulation can be successfully denied on ground of interference with state regulation in the present case, the FPC is ousted of jurisdiction in all cases," it was asserted. "Such a claim would be contrary to decisions of the Supreme Court sustaining FPC jurisdiction in cases where it asserted that it does not exist by virtue of interference with state regulatory efforts."

Reasoning questioned.—The commission, it was contended, failed to state valid reasons for any conclusion that assumption of jurisdiction of the sales by Phillips to the pipe-line companies would interfere with state regulatory efforts.

"The evidence shows without question that the FPC has taken jurisdiction over a number of companies which engage in substantial field operations similar to those carried on by Phillips Petroleum Co. which are also subject to jurisdiction by regulatory agencies of the states of Texas, Oklahoma, and New Mexico, and no conflict was shown to exist between FPC jurisdiction in those cases and that of regulatory commissions." the court was told.

MID-CONTINENT

New Unit Planned

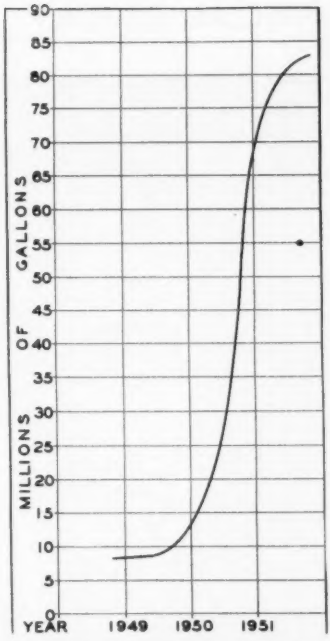
TULSA.—Unitization and pressure maintenance of the Gibson and Hart oil reservoirs in Southeast New Hope field of Garvin County, Oklahoma, will be studied by a steering committee organized here last week by 18 of the field's 26 operators.

Legal, engineering, and geological subcommittees, were created under direction of the newly elected steering committee chairman, J. A. Bermingham, Jr., of The Texas Co., which called the meeting. These subcommittees will prepare recommendations with supporting data to be sent back to the steering committee.

Currently there are 175 producing oil wells in Southeast New Hope field on 6,000 producing acres, developed since October 1948, field discovery date. Shallower reservoir is the Gibson (Third Deese) sand, 22 ft. thick, found from 6,800 to 7,000 ft.; the Hart sand, 12 ft. thick, lies between 6,850 to 7,250 ft.

A limiting gas-oil ratio of 2,000 cu. ft. per barrel is operative for the Gibson reservoir and 4,000 cu. ft. per barrel for the Hart. A 75-bbl. per day allowable applies to each reservoir.

Companies operating at Southeast New Hope are: Amcan Oil Corp., W. E. Anderson, Anderson & Phillips, Anderson-Prichard Oil Corp., Ashland Oil & Refining Co., R. L. Bauman, Weller Bush, The California Co., Carter Oil Co., Cities Service Oil Co., Continental Oil Co., Devonian Co., Kenneth A. Ellison, Gulf Oil Corp., Earle P. Halliburton, Lion Oil Refining Co., Magnolia Petroleum Co., Mid-Continent Petroleum Corp., Phillips Petroleum Co., Max Pray, Sinclair Oil & Gas Co., Skelly Oil Co., B. Smith, Jr., Standard Oil Co. of Kansas, Tide Water Associated Oil Co., and Vickers Petroleum Co.



***COMPANY GROWTH.**—This chart shows the increase in production since Texas Natural Gasoline Corp. was organized in 1948. Current production is at a rate of 83,000,000 gal. per year.*

Expansion Program

Texas Natural Gasoline Corp. to boost production

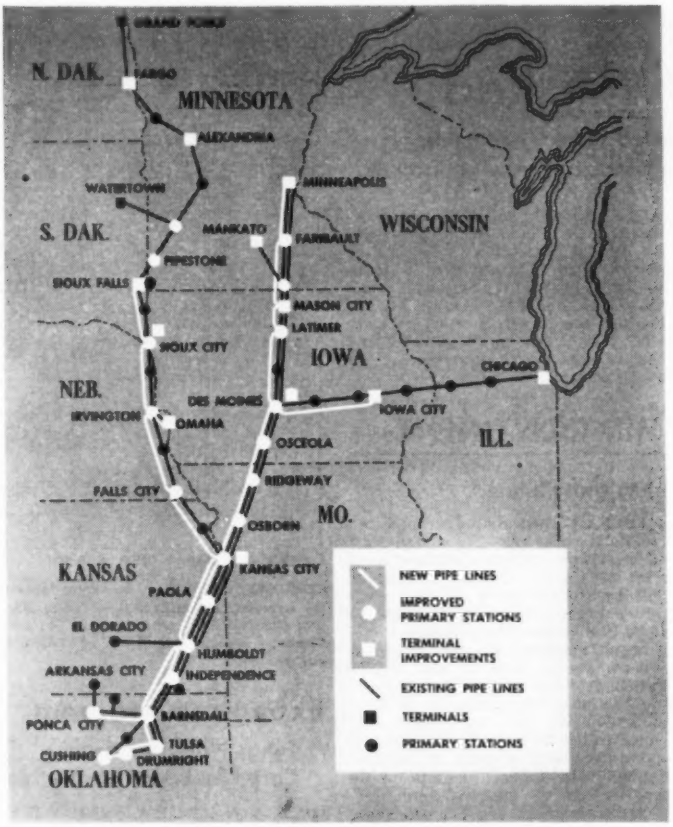
TEXAS NATURAL GASOLINE CORP., Tulsa, manufacturer and marketer of natural gasoline and its byproducts, is now engaged in an expansion program which will increase its production by 79,000,000 gal. to a total of 162,000,000 gal. per year.

Now 3 years old, the firm was organized in 1948 with a staff of only four employes. At present 200 are on the pay roll, and the corporation operates four natural-gasoline plants and owns an interest in a fifth. All plants are in Texas.

Present annual production of the company and its affiliates is 83,000,000 gal.

Provides residue gas.—In addition to aiding conservation of natural gas, the firm provides residue gas for pressure-maintenance operations for secondary recovery of oil and serves as a consultant on storage problems and development of retail markets.

John T. Oxley is president of the firm, with John D. Curtin, Jake L. Hamon, and Edwin L. Cox as vice presidents; Claig H. Perry, secretary; and Leon McVay, general superintendent.



GREAT LAKES SYSTEM.—Black lines on the map indicate existing facilities before the company's expansion program. New facilities are shown in white.

Expansion Nears End

Vast construction program of Great Lakes Pipe Line Co. in final stages; capacity to be boosted by 300 per cent

KANSAS CITY, Mo.—The second phase of a vast expansion program instituted by Great Lakes Pipe Line Co. to boost its system capacity by 300 per cent, is now in the final stages of completion.

When final cleanup work is completed and all lines are operating, the common-carrier system will be able to deliver 65,000,000 bbl. of refinery products annually (177,000 bbl. daily) over a large area of the Middle West. *(The Oil and Gas Journal, May 25, 1950, page 88.)*

Included in the new construction are the following product lines: 8 and 12-in. lines from Tulsa to Barnsdall, Okla.; 8 and 12-in. lines from Ponca City, Okla., to Barnsdall; three 8-in. and two 12-in. lines from Barnsdall to Kansas City, Mo.; two 8-in. and one 12-in. lines from Kansas City to Des Moines; two 6-in. and one 12-in. lines from Des Moines to Minneapolis; 8 and 12-in. lines from Kansas City to Sioux Falls, S. D.; an 8-in. line from Sioux Falls to Alexandria, Minn.; a 6-in. line from Alexandria to Grand Forks, N. D., and additional connecting lines of various sizes.

Financing for the expansion was provided by sale of a $55,000,000 bond issue to private investors in July 1949, $25,000,000 more than was expended during the 1945-47 expansion program.

First phase.—The first phase of postwar construction on the Great Lakes system, during 1945-47, increased capacity 50 per cent over prewar levels, and expanded pipe-line service for the carrier's Oklahoma-Kansas refiner-shippers. During this phase, a new line was extended from Kansas City to the Northwest to serve the existing terminal at Omaha, and new terminals were constructed on this line at 100-mile intervals at Sioux City, Iowa, Watertown and Sioux Falls, S. D.; Alexandria, Minn., and Fargo and Grand Forks, N. D.

Each of the two expansion programs was entirely separate in planning and development, but the later construction was planned so that increased capacity would be provided in progressive steps on various sections of the system.

Construction plan.—Never before at the start of construction had Great Lakes had available and promised traffic so far in excess of its existing capacity. To meet this need, principal line diameter was increased to 12 in., which under similar operating conditions, provides a capacity approximately equal to three 8-in. lines.

The first projects scheduled for construction were 930 miles of 12-in. from Ponca City and Tulsa to Minneapolis through Kansas City, Des Moines, and Mason City, Iowa; another 12-in. line from Kansas City northwest to Omaha; and a 45-mile, 8-in. line from Cushing through Drumright, Okla., to Tulsa. Before the 12-in. line was completed to Omaha, it became apparent that further capacity was required on the northwest leg of the system, and the line was extended 165 miles to Sioux Falls.

Pumping equipment for the 12-in. lines was installed by enlarging alternate existing station buildings on the route of the parallel smaller lines, thus providing station spacing of approximately 100 miles for the 12-in. lines.

In addition to existing pumping-station expansion, a new station was erected at Pipestone, Minn., to provide further capacity of the 8-in. line beyond Sioux Falls. New buildings also were erected at Cushing and Drumright, Okla., and a total of 16 stations were enlarged to handle new equipment.

New tankage.—Additional transport-loading facilities and tankage were provided at 9 of the 14 terminals: Des Moines, Mason City, Mankato, Minneapolis, Omaha, Sioux City, Sioux Falls, Alexandria, and Fargo. New tankage was also erected at the

Kansas City terminal and at Tulsa. In all, 77 tanks with gross capacity of 3,780,000 bbl. were erected. Largest addition was made at Minneapolis, with 13 tanks having a capacity of 1,040,000 bbl.

By January this year the entire 1,300 miles of new 12-in. lines were in operation, and the 8-in. line from Cushing to Tulsa was operating with permanent pumping units.

By employing a telescope method of construction, involving two weights of line pipe, a saving in steel tonnage was effected. Pipe laid on the discharge side of pumping stations weighed 41.5 lb. per foot on the 12-in. On the suction side of the station, 33.4-lb. pipe was used. Utilizing the lighter-weight pipe in this manner was possible without reducing the safety factor of the line. Cathodic protection is employed along the system.

New features used.—A new feature at pumping stations is a coaxial cable, which is used as a control circuit to tanks on the tank farm. One wire controls all of the in-and-out functions of all tank valves and pumps connected to these tanks. Also, new-type electric gages are used extensively at product-acceptance points. These remote-control devices are frequency generators that discriminate and pick out the particular frequency with which they are in harmonic agreement.

In order to be able to dye all products at a central terminal location, a pump-activated educator is incorporated. A small portion of the stream is taken from the receiving line and passed under pump power through an educator which in turn lifts the dye in dry form out of a calibrated container. The finely powdered dye mixes with the gasoline stream on its way to tankage and when it reaches that point is circulated through a four-armed spider which insures full mixing in 20 to 30 minutes.

Better utilization of terminal tankage resulted from a change made in Great Lakes operating method last May, when a requirement became effective that gasoline be blended with tetraethyl lead before it is accepted at originating points.

Capacity figures.—Great Lakes is reluctant to give out any specific capacity figures on its system.

It claims that the way it is now constituted, such figures are meaningless. There are too many contingent factors that affect shipments, such as various originating points, different grades of products, and volumes consigned to various points. These, the company reports, all must be considered, and any capacity figure quoted would be only theoretical and would have little operating meaning.

WEST COAST

Military Oil Pinch

Agencies, companies confer on coming heavier demands

WASHINGTON. — Officials of the Petroleum Administration for Defense and the Armed Services Petroleum Purchasing Agency met with representatives of 11 oil companies at Los Angeles this week to discuss what quantities of special petroleum products that can be furnished to the military services by West Coast industry during the first half of 1952.

There is a possibility that, with substantial increases in both civilian and military demands expected on the West Coast during the first 6 months of next year, some supply difficulties may result in the area. Deputy Administrator Bruce K. Brown called the meeting with this situation in mind to enable the Government officials to give industry representatives an over-all estimate of supply and demand in District V in an effort to determine the quantity of each product that can be made available to the military services during that period.

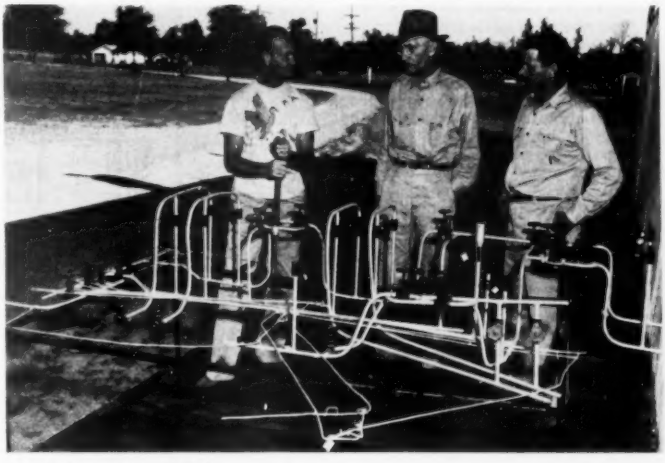
Existing shortage. — Currently, California is short 30,000 bbl. daily of meeting total civilian and military demand, with the prospect that the shortage will increase by another 25,000 bbl. daily over the next year.

Civilian demand is being met, so that the present shortage is confined to military products. However, because of the possibility of increasing deficiencies due to inability to expand production to keep pace with increasing demand, some companies apparently are reluctant to provide even as much as they now could for the military.

More from Gulf Coast.—The answer, according to PAD officials, is to secure the additional products needed from the Gulf Coast, and the idea of the meeting was to assure the companies that they would not be asked to pay the transportation and thereby throw the additional cost upon the civilian consumers, but that the military would pick the products up on the Gulf.

Telegraphic invitations to have representatives at the meeting were sent by Brown to Union Oil Co., Standard Oil Co. (Cal.), Richfield Oil Corp., General Petroleum Corp., Tide Water Associated Oil Co., The Texas Co., Shell Oil Co., Wilshire Oil Co., Hancock Oil Co., Edgington Oil Refining Co., and Douglas Oil Co.

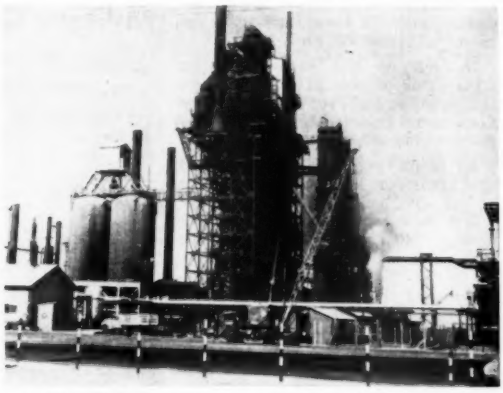
Government officials at the meeting included Thomas L. Apjohn, assistant director of refining; Lawrence W. Lee, PAD director of distribution and marketing; Robert C. Steves, assistant director of PAD's program division; and Capt. I. N. Trippi and James Collins, executive officer and contracting officer for ASPPA, respectively.



Miniature Manifold

This exact replica of station piping at the Sarepta compressor station of United Gas Pipe Line Co. is used to train employes new to the station. By studying the model, an employe can learn the exact arrangement of every inlet and outlet line quickly. The model was built by M. H. Craig, left, station meter inspector, who is shown explaining it to F. L. Denmon, center, and O. L. Corwine. Craig made the replica with ¼-in. scrap pipe and ¼-in. discarded needle valves. Fuel lines were added by J. O. Deen, first engineer, using welding rods.

BIG UNIT.—No. 4 distillation unit. The five furnaces served by one stack constitute one of the world's largest such installations. Heat release is 430,000,000 B.t.u. per hour and absorption. 250,000,000.



BEING REVAMPED.—Shown here is the Bahrein refinery's fluid catalytic cracking unit, which is now being modernized. One column will be converted to crude service during the current revamping program.

Bahrein Today

Refinery-expansion program to add 35,000 bbl. daily to capacity; hot Persian Gulf water creates cooling problem

Dahl M. Duff

BAHREIN, Persian Gulf.—Bahrein Petroleum Co.'s refinery here now ranks as the largest plant operating in the Eastern Hemisphere.

Modernization work now being carried out on the fluid catalytic cracking unit includes the conversion of one column and two furnaces to crude service. When this is completed, probably in late December, the refinery's top throughput capacity will be increased 35,000 bbl. daily to approximately 210,000 bbl. per stream day.

The Bapco refinery operates largely on Saudi Arabian crude received by both pipe line and tanker. Production from Bahrein field, itself, has been stabilized at about 30,000 bbl. daily, and there appears to be little prospect that this can be substantially increased.

The work on the fluid unit is at present the largest project under way at the refinery. Various smaller improvements also are being made, and construction of one kind or another has been going on continuously for several years.

The Bahrein fluid unit was built during the war. The work now being carried out is in general the same as that which has been done on most of these early plants in the United States. Universal Oil Products Co. is assisting with the program, and a large part of the engineering is being done by Bapco in Bahrein itself.

NEW PRODUCER.—Replacement well being drilled in Bahrein field.

Main features of this work consist of elimination of heat exchange with the catalyst cooling recycling circuit, replacement of the slurry settler with a pressure settler, substitution of cyclones for multiclones and precipitators in the catalyst-recovery system, and improved stripping by installation of a catalyst stripper.

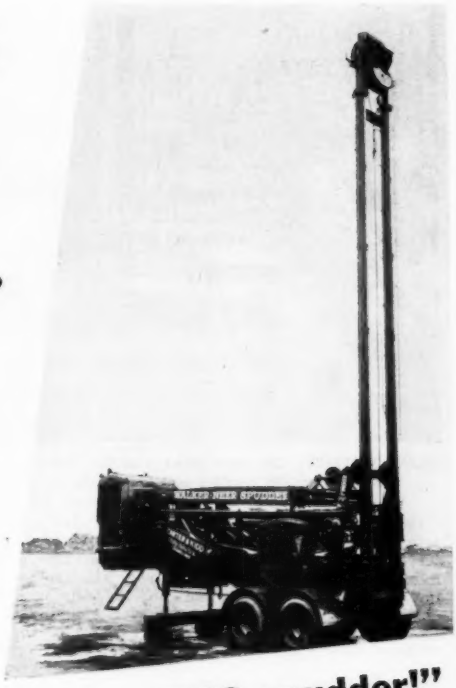
The unit was shut down in mid-September after a successful run of about 8 months. About 3 months will be required for the modernization and for the conversion of one of the two columns which will be made available for use as a crude unit as a result of the work. The catalytic unit itself had been running about 18,000 bbl. daily prior to the shutdown. It is expected to charge 25,000 bbl. daily or more when returned to service.

The program will give the refinery its fifth crude unit. The original two crude stills were built in 1935-36, and a third was added during the war. The fourth unit, which has a capacity of about 88,000 bbl. daily, was placed on stream October 18, 1950.

Cooling problem. — The salt-water cooling system which serves part of the refinery normally provides for requirements of from 75,000 to 80,000 g.p.m. The equipment is designed for a maximum summer inlet water temperature of 95°, but during the last summer, relative humidity went to 90-92 per cent for 6 to 8 hours daily, and the temperature of the ambient air rose to 121° maximum and ranged from 116° to 120° on many days.

As a result of this record hot summer in the Persian Gulf, temperature of the refinery inlet water went up to a maximum of 102°. Water requirements rose above the approximately 95,000 g.p.m. the system was able to provide, and the plant could continue operations only by cutting its charge rate. The work now under way at the refinery will increase the salt-water requirements and studies are being made to secure additional pumping capacity.

"They Knew What Cable Tool Men Want . . .



when they designed THIS spudder!"

MORE POWER—Walker-Neer Spudders have extra power for hoisting greater loads out of the hole at top speed—a major time-saving factor resulting from Walker-Neer's efficient V-Belt and High-Speed-Roller-Chain design.

SMOOTH, QUIET DRILLING MOTION—Walker-Neer's exclusive Tor-Shock (Rubber Torsion) Shock Absorber eliminates all solid jar while putting extra snap in the tools—relieving stress and strain throughout the rig.

FREE SPOOLING — Traveling spudding sheaves and heel sheaves attached to the spudding beams eliminate spooling problems.

BAD-WEATHER EFFICIENCY—V-Belt drive from engine to clutch shaft prevents slippage and increases power and efficiency under adverse conditions.

CONVENIENT, INDEPENDENT CONTROLS—All controls are arranged for maximum convenience at one operator's platform. Each drive is operated by an independent clutch; thus, no part sustains wear except when performing a necessary function.

NO STOPPAGES FOR LUBRICATION—All drums and sheaves are mounted on ball or roller bearings and ordinarily require no lubrication during the period of drilling a well.

MAXIMUM SAFETY—The mast ladder extends from the mast itself, eliminating mast climbing hazards. Hydromatic brakes are standard on the larger models, and optional on all others. And Walker-Neer's control system assures split-second control.

FASTER HAULING AND SETTING UP—An improved Tamdem Axle assures safety at high speeds and permits crossing of rough terrain with unmatched ease and safety. In addition, owners testify that Walker-Neer Spudders have no equal in ease of setting up and tearing down.

Pictured above, Walker-Neer Spudder, Model S-32 Special, for 3,000-foot top-to-bottom drilling, 4,000-foot cleanout. There is a Walker-Neer model for every need. WRITE FOR FULL PARTICULARS.

Walker-Neer MACHINE COMPANY

SPUDDERS PULLING UNITS ROTARIES

P. O. Box 2490—Wichita Falls, Texas

ISLAND REFINERY.—This view shows a section of Bapco's Bahrein refinery looking north from the catalytic cracking unit toward the reformers and thermal crackers.

Besides the salt-water system, the refinery has cooling towers which serve No. 1 power plant, Nos. 1 and 2 crude stills, two thermal cracking units, one reformer, and No. 1 polymer plant. A new induced-draft cooling tower serves Nos. 2 and 3 reformers.

Other facilities.—Now nearing completion at the refinery is a new octane laboratory. This will be a part of a complete new refinery-control laboratory for which designs are now being made and materials ordered. The control laboratory will be built in two increments, the first to be started soon.

Bapco's refinery is located on the east coast of the island, and the tanker-loading facilities as well as the drum-manufacturing and filling plant are at nearby Sitra. Bapco has a T-head pier with four berths, and also an older island pier with two berths. Lighting towers are being added to both these piers to enable loading and unloading to be carried out around the clock.

Refinery tankage is also being increased. Plans call for four new tanks, one at the dock for crude, two at the refinery for crude, and one at the refinery for gas oil. At present, the 125,000 bbl. daily of Arabian crude received through the submarine pipe line is being supplemented by more than 30,000 bbl. daily moved by tanker from Ras Tanura to Sitra.

Bapco is making plans to enlarge the refinery shops which also serve the company's producing department. Additions are to be made to the present structures for the welding, boiler and machine shops.

Personnel. — Continuous efforts are being made by Bapco to increase the number of Bahreinis and other rupee-paid personnel in its operations.

The training is patterned after the intensive T.W.I. (training-within-industry) program carried out in the United States during the war. A new training school is under construction and due for completion this fall between the refinery and Awali, the Bapco community and headquarters. It will give both academic and practical work supplementing on-the-job training.

The refinery operations employ approximately 7,400 persons, of which all except about 500 are Bahreinis and some Indians who operate the vacuum unit, the oxygen plant, water treating facilities, and asphalt converters, as well as many other important parts of the operations on an ever-increasing scale.

Production operations.—Bapco's own crude production of approximately 30,000 bbl. daily comes from about 70 wells. The field has a total of 101 wells, including four for observation of the water-oil contact and one gas-oil observation well on which readings are taken quarterly.

The principal producing section at Bahrein, formerly called the first and second pays, is now commonly referred to as the Bahrein zone. Average completion depth of wells to this zone is 2,200 to 2,300 ft. The Bahrein fourth pay, equivalent of the Arab zone elsewhere, provides minor amounts of oil and high-pressure gas in large volume.

Gas injection has been carried out in the field since April 1938, and there are now four injection wells into the Bahrein zone. Gas at about 2,100 psi. is taken from the fourth pay and injected without compression at approximately 1,300 psi.

Three rigs are now running in the field, two Cardwells on workovers, and one Wagner-Morehouse which is used to drill replacement wells. The present drilling program includes these field wells and also semiexploratory drilling in the south extension of the field where there are now eight producing wells.

Bapco has carried out two unsuccessful deep tests in the field. The first was started prewar, suspended, and later taken to 10,078 ft. The second well was finished about a year ago, at 11,085 ft.

Abu Dhabi Case Settled

Superior Oil Co. of California has been given certain offshore oil rights from the Trucial Coast shaikhdom of Abu Dhabi as a result of a concession arbitration case.

The arbitration was over the question of whether the 1939 concession held by Petroleum Development (Trucial Coast) Ltd., included all the offshore area controlled by the shaikh. The award upholds the validity of the rights given Superior on the Continental Shelf section of the shaikhdom. At the same time it found that the nearer territorial waters were included in the Petroleum Development concession.

The arbitration was conducted as provided for disputes under terms of the concession. The case was heard in August in Paris by the arbitration umpire, Lord Asquith of Bishopstone. Superior operates in the Middle East through International Marine Oil Co., Ltd., in which it is a partner with the Trinidad Leaseholds, Ltd., interests. It is now carrying on geophysical work at Qatar as a result of a similarly decided arbitration case involving the Petroleum Development concession in Qatar about a year and a half ago.

McCarthy Says Deal Signed

Glenn McCarthy, Houston operator, announced late last week in Paris that he has completed a deal to take a 51 per cent interest in Egyptian National Petroleum Co. The company has exploration rights covering 121 blocks of 40 square miles each in Egypt.

The remaining 49 per cent is owned by varied interests, mostly Egyptians. The deal is reported to be contingent on changes in Egyptian laws restricting foreign participation in petroleum development.

Chauk Drilling Resumed

Burmah Oil Co., Ltd., has resumed drilling in the Chauk field in central Burma.

The first well drilled since the war was spudded in recently in a ceremony attended by Thakin Nu, Burmese prime minister. A limited number of new wells will be drilled in Chauk and older wells deepened to maintain crude supplies for the refinery B.O.C. is now operating and enlarging at Chauk.

"OLD MAN RIVER"

helps cut line pipe costs

Armco can ship direct by barge down the Ohio and Mississippi to help cut transportation costs on line pipe.

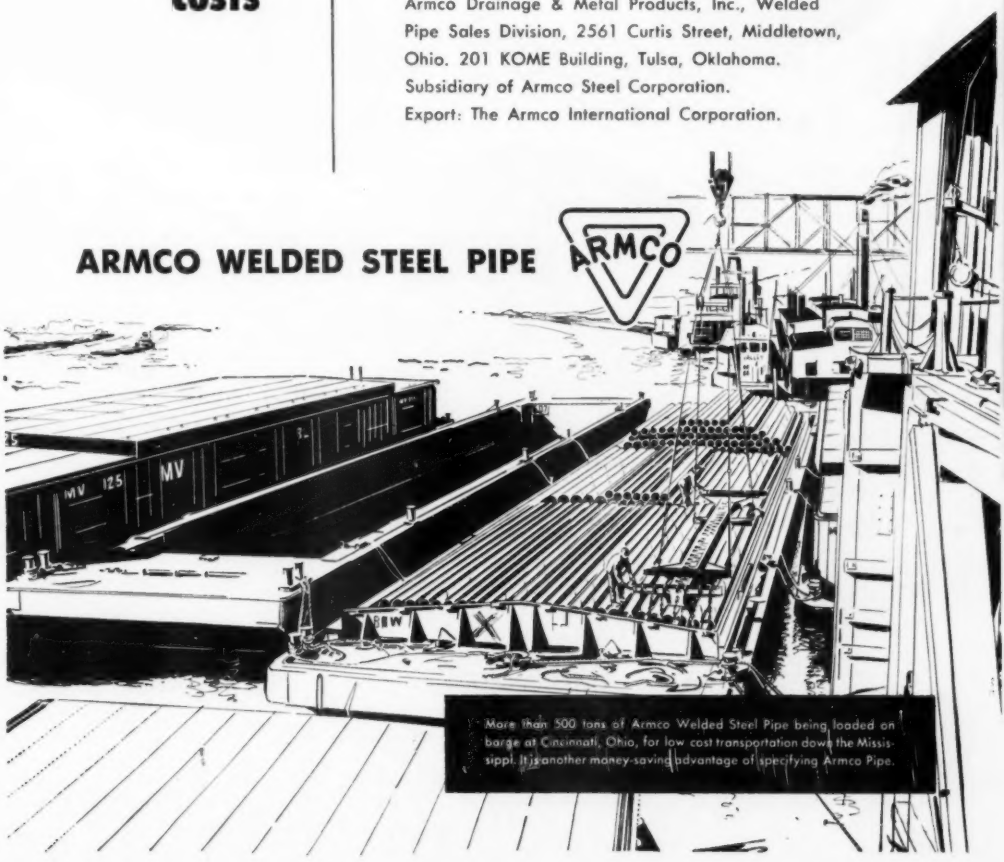
You can also save in many other ways by using Armco Welded Steel Pipe. The wide range of diameters (6 to 36 inches) with wall thicknesses from 9/64- to 1/2-inch means you can match exact needs without buying excess metal. Installation costs are less because lengths up to 50 feet simplify and speed the work. There are fewer sections to handle, fewer joints to assemble.

Other advantages of Armco Steel Pipe include flexibility—slack loops and cold bends are no problem—and a high safety factor against internal and external pressures.

Use Armco Pipe with confidence for oil and gas lines, gathering systems and wherever else you need dependable piping. Write for complete information. Armco Drainage & Metal Products, Inc., Welded Pipe Sales Division, 2561 Curtis Street, Middletown, Ohio. 201 KOME Building, Tulsa, Oklahoma. Subsidiary of Armco Steel Corporation. Export: The Armco International Corporation.

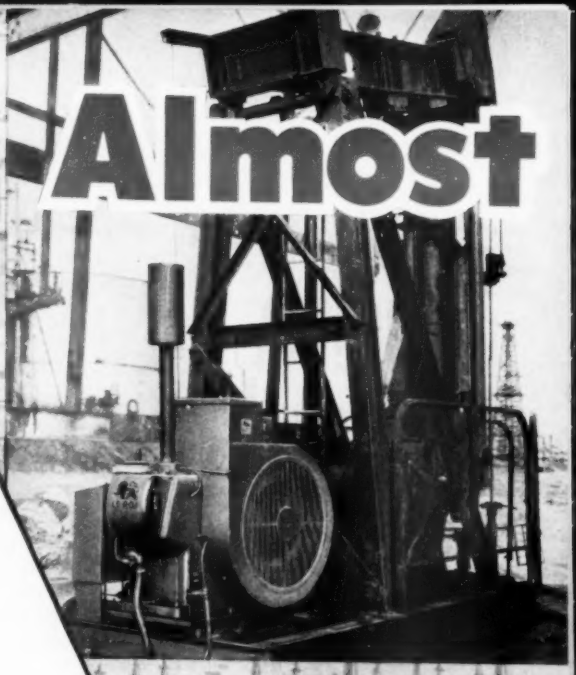
ARMCO WELDED STEEL PIPE

ARMCO



More than 500 tons of Armco Welded Steel Pipe being loaded on barge at Cincinnati, Ohio, for low cost transportation down the Mississippi. It's another money-saving advantage of specifying Armco Pipe.

Almost

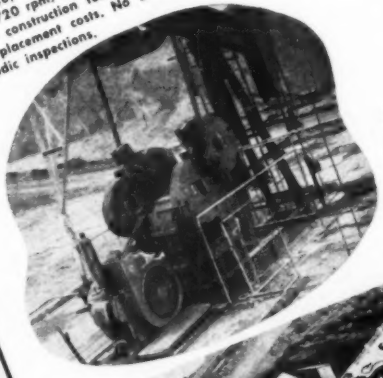


LE ROI

Le Roi 3 way Partnership

1. Better Engines

Le Roi's A288, for example. It has a wide speed range of 360 to 720 rpm. Its removable wet cylinder sleeves and other construction features simplify maintenance, reduce replacement costs. No shut-down is necessary for periodic inspections.



2. Better Applications

Exclusive Le Roi distributors are oil-field power specialists. They know engines. That's why they can select the right power unit for any application. That's why you can count on Le Roi for dependable, low-cost power.

3. Better Service

Keeping your Le Roi engines running is the sole responsibility of our distributors. They handle only Le Roi. You get personal attention from engine experts. Large parts-stocks and skilled mechanics assure prompt service and a minimum of down-time.

Indestructible!

Le Roi A288 Pumping Engine

One typical installation shows more than 35,000 hours and it's just beginning its useful life. That's stamina — proof that Le Roi's A288 puts you way ahead of the field!

YOU don't have to pamper this pumping engine. No, sir — not Le Roi's A288. It's built to pump more oil — longer — safer — and with less maintenance — than any other well-pumping engine!

The A288 is the only engine to be recommended by one major pumping-engine user for continuous service *unattended for up to two weeks at a time.*

Here are just a few of the reasons for the A288's unfailing dependability:

- Patented, closed "vaporizing-condensing" cooling system requires almost no make-up water — keeps temperatures high and prevents sludging even in sour-gas areas.
- Heavy flywheel maintains even-speed operation under unbalanced loads.
- You don't have to shut down the A288 for periodic inspections or for adding oil.
- Big crankcase oil capacity permits long intervals between oil filling.
- There are no grease fittings, belts, or other accessories that need attention.

Let your Le Roi distributor tell you more about the A288 — and show you installations. See for yourself why you're way ahead of the field, when you let Le Roi's 3-way partnership work for you.

LE ROI COMPANY

MILWAUKEE 14, WISCONSIN

***Plants:* Milwaukee • Cleveland • Greenwich, Ohio — *Oil Field Headquarters:* Tulsa, Oklahoma**

LE ROI

See these Le Roi Distributors for a Profitable 3-way Partnership

Oklahoma
Le Roi Company Branch—Tulsa
Carson Machine & Supply Co.—Oklahoma City

East & South Texas, Gulf Coast
Southern Engine and Pump Company — Houston, Kilgore, Edinburg, Dallas, San Antonio, Corpus Christi, Texas, and Lafayette, Houma, Louisiana.

North & West Texas, New Mexico
General Machine & Supply Co. — Odessa, Snyder, Texas.
Mortax Engine & Equipment Co.—Wichita Falls, Texas.

Kansas
Carson Machine and Supply Co.—Great Bend

Illinois — Western Kentucky
Western Machinery & Engine Company—Centralia, Illinois and St. Louis, Missouri.

Typical Le Roi Service Facility

Here's the efficient well-arranged parts department of the Le Roi-Rix Co.'s Long Beach branch. Two more offices—at Bakersfield and Los Angeles — are similarly equipped. All three offices maintain prompt 24-hour service. Le Roi has service facilities like these throughout the oil fields — another reason why you can depend on Le Roi.

Michigan
Hafer Engine Service — Reed City

Rocky Mountain Area
Gehring Equipment Co. — Casper, Wyoming, Rangeley, Col.

Northern Louisiana & Mississippi
Ingersoll Corporation — Shreveport, Louisiana, and Jackson, Mississippi.

West Coast
Le Roi-Rix Machinery Co. — Los Angeles, Long Beach and Bakersfield, Calif.

Appalachian Area
P. C. McKenzie Co., Pittsburgh, Bradford.

Canada
Lucey Export Ltd. — Calgary, Edmonton, Alberta.

P-111

Production Steadies

Kuwait slump due to tanker difficulties offset by gains in other Middle East areas, United States, Latin America

Dahl M. Duff

WORLD crude-oil production in September showed little change from the previous month, gains in output in the United States and several other countries being offset by a decline in Kuwait.

Daily average for the month, including estimated Russian and eastern European production, was approximately 11,757,000 bbl. daily. Production during August averaged 11,742,000 bbl. daily.

The September production figure, as have those of the two previous months, reflected the loss of Iranian production which up to the shutdown in July was running between 650,000 and 700,000 bbl. daily. During September Iranian National Oil Co. reported it produced about 3,300 bbl. daily from Agha Jari field.

Below high point.—September's world production was some 246,000 bbl. daily below the high point reached in June, the last full month before Iranian fields were closed in.

The deficit in supplies is further emphasized by the fact that an 8 per cent annual gain in demand means approximately a 750,000-bbl. daily additional requirement in the United States and abroad exclusive of Communist areas.

Stock withdrawals abroad coupled with a slackening of demand in the United States and some important foreign areas have enabled the industry to overcome the loss of Iran's production.

Middle East.—The drop in production in Kuwait in September amounted to 58,000 bbl. daily and was attributed to difficulties in the scheduling of tankers lifting crude at the Mena-al-Ahmadi terminal. Iraq's production, nearly all of which comes from Kirkuk field, rose slightly to about 181,000 bbl. daily, a new record.

Arabian American Oil Co. is Saudi Arabia, now the world's largest producing company, established another record with a daily average in September of 847,100 bbl. daily. The minor production in Iran occurred after the evacuation of the last British staff and was carried out by the Iranians more or less on a trial basis using some unfilled tankage at Bandar Mashur.

Venezuela.—Venezuela reached another high in its production in September with a daily average of 1,725,200 bbl. daily. This was about 16,000 bbl. daily over August, when output in the country declined due to storms which damaged electric-power facilities in the Lake Maracaibo region.

Venezuelan production by companies during September follows (government figures): Creole, 778,576; Shell, 538,072; Mene Grande, 251,417; Socony-Vacuum, 53,459; Texas, 21,917; Mercedes, 23,436; Atlantic, 17,574; Richmond, 10,256; Sinclair, 13,331; Pantepec, 9,870; Phillips, 6,395; B.C.O., 943.

Other western.—There were no marked changes in any of the other major producing companies in the

WORLD CRUDE-OIL PRODUCTION
(Thousands of barrels daily)

Country—	Sept. 1951	Aug. 1951	Sept. 1950
Western Hemisphere:			
Argentina	73.0	72.5	65.2
Bolivia	1.5	1.5	1.7
Brazil	1.4	1.4	1.5
Canada	163.8	170.5	89.9
Chile	2.5	2.5	1.5
Colombia	105.5	106.9	97.9
Cuba	0.2	0.1	0.3
Ecuador	7.3	7.3	7.1
Mexico	214.0	214.0	199.0
Peru	45.5	45.3	41.0
Trinidad	57.5	57.0	55.0
Venezuela	1,725.2	1,709.0	1,586.0
Total	2,397.4	2,388.0	2,146.1
Europe and Africa:			
France	6.4	6.3	3.2
French Morocco	1.8	1.8	0.9
Germany	28.6	27.4	22.5
Italy	0.4	0.4	0.2
Netherlands	13.4	13.6	13.5
Egypt	44.3	43.5	45.2
United Kingdom	0.9	0.9	0.9
Total	95.8	93.9	86.4
Middle East:			
Bahrein	30.1	30.1	31.1
Iran	3.3	9.3	611.0
Iraq	181.2	176.6	160.8
Kuwait	628.7	685.6	368.8
Qatar	51.0	49.0	36.4
Saudi Arabia	847.1	837.8	594.8
Turkey	0.3	0.3	0.5
Total	1,741.7	1,789.7	1,803.4
Far East:			
British Borneo	105.0	105.0	88.0
Burma	2.0	2.0	1.8
China	2.2	2.2	2.0
India	5.0	5.0	5.2
Indonesia	155.0	155.0	150.0
Japan	6.5	6.3	5.1
New Guinea	4.9	4.9	4.8
Pakistan	3.1	3.3	4.0
Total	283.7	283.7	260.9
Total foreign less Russia and E. Europe	4,518.6	4,555.3	4,296.8
Estimated Russia and Eastern Europe:			
Austria	40.0	40.0	30.0
Romania	85.0	85.0	85.0
Russia	800.0	800.0	750.0
Other E. Europe	29.8	29.8	24.6
Total	954.8	954.8	889.6
Total, foreign	5,473.4	5,510.1	5,186.4
United States	6,284.0	6,232.3	5,887.9
World total	11,757.4	11,742.4	11,074.3

Figures are from reliable reports in the industry or official government sources. Data for Russia and Eastern Europe are based on competent estimates; no authentic information is available on month-to-month production in these areas. Complete current reports also are lacking for certain countries of Southeast Asia. Data for earlier months have been revised where necessary.

Western Hemisphere. Peru continued to show an encouraging upturn in output, all of which is being accomplished from existing concessions since exploration in other areas is blocked by the prolonged effort to obtain new and workable petroleum legislation.

Estimated United States production in September of 6,284,000 bbl. daily represented a new record.

Western Germany's slight increase gave that country a new high in its crude output. The official total in metric tons was 121,520, consisting of 53,978 tons from Emsland, 57,419 tons from Hanover, 9,597 tons from Schleswig - Holstein - Hamburg, and 526 tons from Baden.

Colombia's September production totaled 107,675 bbl., but this included 2,223 bbl. daily of condensate from the De Mares concession now operated by the government Empresa. Crude production by concession was: De Mares, 36,892 bbl. daily; Barco, 27,912 bbl. daily; Yondo, 36,362 bbl. daily; Cantagallo, 1,300 bbl. daily; Dificil, 1,804 bbl. daily; and Velasquez, 1,182 bbl. daily.

TREND OVER THE LAST YEAR

	Western Hemisphere less. U. S.	Middle East	Total foreign less Russia & E. Europe
1950—			
October	2,185.7	1,893.2	4,428.9
November	2,213.8	1,899.1	4,474.1
December	2,213.6	1,988.9	4,563.0
1951—			
January	2,210.9	1,874.2	4,450.9
February	2,220.3	1,947.4	4,536.8
March	2,254.1	1,961.1	4,581.1
April	2,261.5	2,013.4	4,632.1
May	2,314.0	2,203.8	4,878.4
June	2,335.5	2,172.4	4,877.8
July	2,374.5	1,835.5	4,579.0
August	2,388.0	1,789.7	4,555.3
September	2,397.0	1,741.7	4,518.6

Strength in Iran

Mossadegh's government gets 90-0 confidence vote after announcement of election plans; refinery again operating

PROSPECTS of settling the Iranian nationalization problem through a new government in Teheran seemed remote early this week.

Prime Minister Mossadegh was having some success in entrenching himself and his group in office by executing several adroit political maneuvers on his return to Teheran from a 5½-week trip to the United States and a brief visit to Egypt.

The Majlis, or lower house of the Iranian Parliament, gave the government a 90-0 vote of confidence early this week. Seventeen deputies abstained. The vote came after the prime minister announced that the government would hold national elections immediately.

Postponement of the elections had been hoped for by Mossadegh's opposition. It was felt that the increasing economic difficulties in Iran from the loss of oil revenue will be so severe in a few months that Mossadegh could not win.

Refinery operating.—Meanwhile, new information on conditions at Abadan came from a first-hand report by A. M. Stahmer, German oil information service publisher, who has recently visited the refinery center.

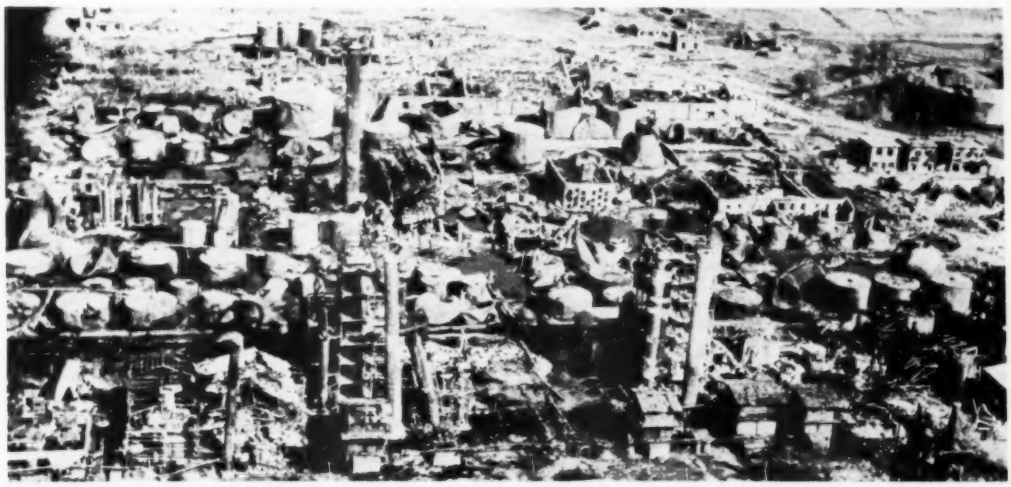
The one distillation unit which was started October 2 has been running 11,400 tons daily (about 86,000 bbl.) of crude from Agha Jari field. Stahmer said all equipment at Abadan is still in the same state as when the last British staff left.

Production from the single unit operating consists of 24 per cent gasoline and light fractions, 10 per cent kerosine, and 14 per cent gas oil.

Hussein Makki, a leader of the oil nationalization movement, told Stahmer that about 1,400 applications for jobs with the Iranian company have been received from persons in the United States, Britain, Netherlands, Italy, France, Argentina, Austria, Switzerland, and the Scandanavian countries. Only 50 applicants thus far have been given serious consideration.

Makki said only about 200 foreign technical men are needed to bring the fields and refinery to full production. An official Iranian statement on the partial reopening of the refinery said operations will have to stop early in December when storage is again filled. Only outlet at present for Abadan's production is sales on the Iranian market.

Supply problem.—The Iranian statement said the stores manager of the Iranian organization is attempting to buy needed supplies and spare parts through the Teheran agents of foreign companies. The Iranian plans call for organizing a supply depot and purchasing in the United States and Europe.



BOMBED OUT.—What bombs and naval gunfire can do to an oil refinery is graphically illustrated in this aerial view of the ruins of the plant at Wonsan, Korea. The refinery is located near the water's edge close to the North Korean port city. Craters throughout the site are filled with water. Hardly a piece of equipment escaped damage from explosives during the air and sea attacks, and what remains has been accumulating rust for more than a year.

PERSONALS

In New Job

Pan Am Production names Vetter first vice president

THE new first vice president of Pan American Production Co., Houston, is John M. Vetter, who was one of the firm's original employes.

Widely known in the oil industry and in national geological circles, Vetter began his career in 1922 after receiving a B.S. degree in geology from Nebraska University. He first became associated with Mexican Eagle Oil Co. at Puerto, Mexico, as field geologist. Two years later he resigned and returned to Houston to join the Rio Bravo Oil Co. as geologist and was later advanced to the position of superintendent of land and geological work.

In 1929 he resigned to enter consulting work at Houston, returning to Rio Bravo in 1931 as head of the geological department.

In 1935 he joined Pan Am Production as chief geologist, was made superintendent of land and geology in 1938, and was appointed assistant manager of both Pan American Production and Pan American Gas Co. in 1947.

In 1950 he was elected vice president of the firm, and at that time relinquished his duties as assistant manager of the gas company.

Vetter served as vice president of the American Association of Petroleum Geologists in 1940, and is a past president of the Houston Geological Society, and the Houston Engineers Council. At the present he is a director of the local Tax Research Association.

Merle A. Sparks, who for the past 6 months has been assistant to the director of the production division of the Petroleum Administration for Defense in Washington, D. C., has been named to the newly created position of coordinator of joint operations in Sun Oil Co.'s Southwest division. His headquarters will be in Sun's Dallas office, where he was a senior petroleum engineer for the company before leaving for Washington.

Norman T. Robey, assistant superintendent of the heavy-oils division at the Wood River, Ill., refinery of Standard Oil Co. (Ind.), will become an additional assistant general superintendent of the Casper, Wyo., refinery December 1.

Clarence R. Round has been promoted to the newly created position of assistant to **Harold G. Osborn,** vice president in charge of manufacturing of Continental Oil Co. He will make his headquarters in Ponca City, Okla. **I. A. Harrisberger,** who has been chief manufacturing clerk since 1937, has been appointed to succeed Round as coordinator of manufacturing operations at Ponca City. Round has been with the firm since 1929; Harrisberger joined the company in 1922.

Thomas E. Matson, formerly division geologist at Tulsa for Pure Oil Co., has joined Manhart, Millison & Beebe, petroleum - exploration consultants at Tulsa, as geologist. A graduate of the University of Oklahoma in 1939, Matson was associated with Kingwood Oil Co. and Ohio Oil Co. in the Illinois basin until the beginning of World War II. Following his service in the Air Force, he joined Pure as district geologist at Ardmore, Okla.

Walter C. Pew has been elected to the board of directors of Sun Oil Co. He was general sales manager of Sun for 4 years before entering the Armed Forces during World War II. Later he served as deputy chief of the petrol, oil, and lubricants section of Gen. Dwight Eisenhower's staff.

Leon Jones has been elected president of Atlantic Oil Corp., Tulsa. **Paul C. McCready,** general sales superintendent of the firm, was named a vice president, and **H. L. Ford,** who has been secretary and assistant treasurer, was named secretary and treasurer. **Frank Barnes** was reelected vice president. **John T. Nicholson,** vice president of Fitzgerald & Co., New York City, was elected a new director.

Don M. Rounds, of Miami, Okla., has joined Skiles Oil Corp., Mount Carmel, Ill., as Rocky Mountain division manager and is opening an office at Denver.

Robert E. Wilson, chairman of the board of Standard Oil Co. (Ind.), will receive one of the Northwestern University Centennial Awards for the Northwest Territory which will be presented December 2 at Northwestern's Centennial Convocation.

John S. Cruse, Jr., formerly senior geologist for Amerada Petroleum Corp. for the past 18 years, has joined J. D. Hancock interests as a consulting geologist at Dallas.

John E. McCleary has been appointed assistant manager of the crude-oil department of Humble Oil & Refining Co. He has been with the firm since 1936.

Jerry Covington has resigned from Humble Oil & Refining Co. after 6 years' service to join **Gustave Ring,** independent oil operator at Midland, Tex., as geologist.

Victor Church, formerly geologist with Shell Oil Co. at Bakersfield, Calif., is now with Oceanic Oil Co. at Bakersfield.

Wade W. Turnbull, Carter Oil Co., Mattoon, Ill., has succeeded **Charles A. Doh** as vice president of the Illinois Geological Society. Doh has been transferred to the New Orleans office of Schlumberger Well Surveying Corp.

ON TOUR.—Dr. Robert H. Dott, right, director of the Oklahoma Geological Survey, is shown here being greeted by George R. Veronda, Ohio Oil Co. geologist and program chairman of the Wyoming Geological Association, upon his arrival recently in Casper. Dott's Wyoming stop was one of many on a 6-week, 12,000-mile trip sponsored by the Distinguished Lecture Committee of the American Association of Petroleum Geologists.

PERSONALS

GEOPHYSICISTS.—Pictured above in the front row are presidents of the five geophysical societies which sponsored the fifth annual midwestern meeting of the Society of Exploration Geophysicists held in Dallas recently. The societies are local sections of the national S.E.G. organization. National officers of the S.E.G. are pictured in the second row. First row, left to right: F. O. Mortlock, Fort Worth, Gulf Research & Development Co.; L. F. Fischer, Ark-La-Tex (Shreveport), Sohio Petroleum Co.; R. W. Gemmer, Tulsa, (host society), Carter Oil Co.; D. R. Dobyns, Dallas, Magnolia Petroleum Co.; and E. L. Mount, Permian Basin (Midland, Tex.), Continental Oil Co. Officers in the back row are, left to right: R. C. Dunlap, Jr., secretary-treasurer, Geophysical Service, Inc.; Sigmund Hammer, president, Gulf Research & Development Co.; Curtis H. Johnson, vice president, General Petroleum; George E. Wagoner, past president, Carter; and Paul L. Lyons, editor, Carter.

Dr. Lyle F. Albright has joined the University of Oklahoma chemical engineering staff as assistant professor. He was formerly in the research-development department of Colgate-Palmolive-Peet Co.

Frank R. Clark, past president of the American Association of Petroleum Geologists, has been appointed general chairman of the regional A.A.P.G. meeting to be held in Tulsa next May. **A. I. Levorsen,** also a past president of the association, and **John G. Bartram,** nominee for vice president, are cochairmen of the program committee.

J. H. E. Ward will be manager of the new district office opened in Midland, Tex., on December 1 by **Ralph E. Fair,** independent oil operator of San Antonio. For the past 10 years Ward has been with Mid-Continent Petroleum Corp., and has been division geologist for them at Midland since July 1950.

P. M. Carmondy, operating manager of Socony-Vacuum Oil Co.'s lubrite division at St. Louis, has been transferred to the Albany, N. Y., division as operating manager, succeeding **W. F. Richartz,** who has retired after 40 years with the company. **F. W. Pofahl,** field operating assistant of the company's Lakes division, Buffalo, has been transferred to St. Louis to succeed Carmondy. **L. E. Reed,** field operating assistant of the Albany division, in Hartford, Conn., replaces Pofahl in Buffalo.

James W. Brown has been named general manager of Westlund Drilling Co., and Carl J. Westlund, Inc., with headquarters in Midland, Tex. He has been associated with the Westlund companies for 3 years.

James F. Hewson will retire on December 31 as manager of the purchasing department and chief purchasing officer for Standard Oil Co. (Ind.). He will be succeeded by **Donald A. Monro,** chief engineer of the manufacturing department, who will serve under **Harry F. Glair,** the new director of purchases. Hewson began working for Standard in 1917 in the estimating branch of the engineering department, was transferred to the purchasing department in 1920, and became manager of the department in 1939. Monro, who has been with the firm since 1923, was advanced to chief engineer of the manufacturing department in 1945.

R. L. Fentem, seismic party chief for Amerada Petroleum Corp., has been transferred from Levelland to Brownfield, Tex., in the same capacity.

Alvin V. White, drilling engineer for Union Sulphur & Oil Corp., has been transferred from Crowley to Sulphur, La.

Reginald J. S. Pigott, director of the engineering division of Gulf Research & Development Co., Pittsburgh, a subsidiary of Gulf Oil Corp., has been elected president of the American Society of Mechanical Engineers for 1952, it was announced this week at the society's seventy-second annual meeting. He will take office at the conclusion of the meeting on November 30.

Richard J. Monaghan, formerly of Venezuela, has joined **Louis J. Roussel,** independent oil and gas producer, at New Orleans, as geologist and adviser.

Dr. Arno C. Fieldner, chief fuels technologist of the Bureau of Mines, was scheduled to receive an honor award from the Washington Society of Engineers this week. In recogni-

PERSONALS

tion of outstanding professional achievement, this award has been in existence for many years but has been presented only four times previously. Fieldner has been with the bureau for over 40 years.

Donald R. Waugh has been promoted to national supervisor of field operations for the Oil Industry Information Committee of the American Petroleum Institute, effective December 1.

N. D. Clark has resigned as Kansas district geologist for Lion Oil Co., and has joined John Lindas Oil Co., Inc. **Thornton Anderson** will succeed Clark.

Fred M. Oglesby, Tulsa, has resigned as land superintendent of British American Oil Producing Co. to become an independent operator. Oglesby has been with British American 14 years. Previously he was with Shell Oil Co. and Cities Service Oil Co.

Frank Ausanka is now in charge of Nebraska operations for Brown Drilling Co. He succeeds **Gene Dawson,** who has been transferred to South America.

Francis Schuster, Troy Oil Co., Indianapolis, has been elected president of Indiana Independent Petroleum Association to succeed **Morris Parker,** of Central West Oil Co., South Bend. **Russell Williams, Jr.,** of Gaseteria, Inc., Indianapolis, was elected vice president, and **Emmett Farmer,** Capitol Oil Co., was reelected treasurer.

Emmette Shieck has resigned from Morton Oil Co. at Casper, Wyo., and has opened offices there as a consulting geologist.

I. B. Tietze has been appointed general superintendent of the crude-oil pipe-line division of Phillips Pipe Line division of Phillips Pipe Line Co. subsidiary of Phillips Petroleum Co. He will continue as assistant to **W. H. Wallace,** vice president of Phillips Pipe Line. Tietze joined Phillips immediately following graduation from the University of Missouri in 1926.

John W. Newton, vice president of Magnolia Petroleum Co., Beaumont, Tex., has been named chairman of the newly formed petroleum division of the National Association of Manufacturers' southwestern regional advisory committee. The new committee will work in cooperation with the American Petroleum Institute and other groups to offer the services and facilities of N.A.M. to the oil industry's public relations effort.

AT GEOLOGISTS' MEETING.—Three of the principal figures at the recent meeting in New Orleans of the Gulf Coast Association of Geological Societies are the men above. Left to right are T. H. Philpott, Carter Oil Co. geologist and program chairman of the Shreveport society; Frank A. Morgan, vice president in charge of exploration of Richfield Oil Corp., and president of the American Association of Petroleum Geologists; and S. L. Digby, Louisiana conservation commissioner.

James H. Daniel, formerly district drilling engineer for American Trading Production Corp. in the Abilene, Tex., district, has been named field superintendent in the West Texas division. In that capacity he will be in charge of field drilling and production operations for the company in West and West-Central Texas. He will move to the Midland, Tex., division office around December 1. **James R. Favors** has been named drilling engineer in Abilene to succeed Daniel.

DEATHS

Thomas Calvin Williams, 70, retired oil man, died in Brownwood, Tex., November 19.

William C. Baker, 69, veteran oil man, died in Tulsa November 21. Prior to forming the old Pennant Oil & Gas Co. in 1917, Baker was chief oil scout and superintendent of the scouting and leasing department of Roxana Petroleum Co.

Joe Land, 56, long-time employe of Sinclair Pipe Line Co., died November 20 at Bartlesville, Okla.

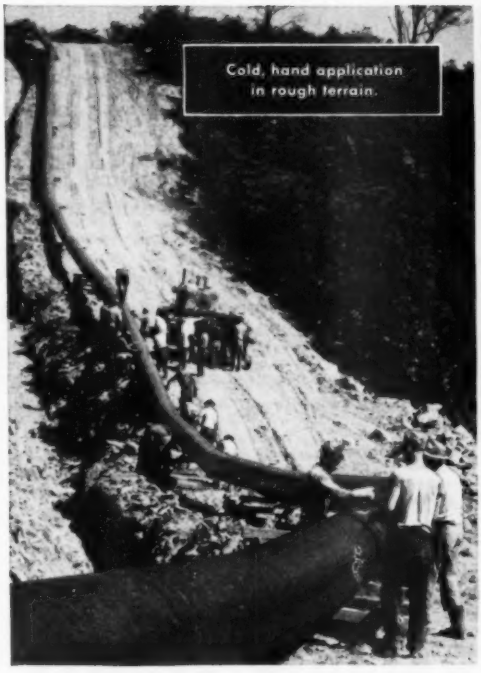
Raymond Charles Force, first president of Caterpillar Tractor Co., and a member of its board of directors, died November 15 at Oakland, Calif.

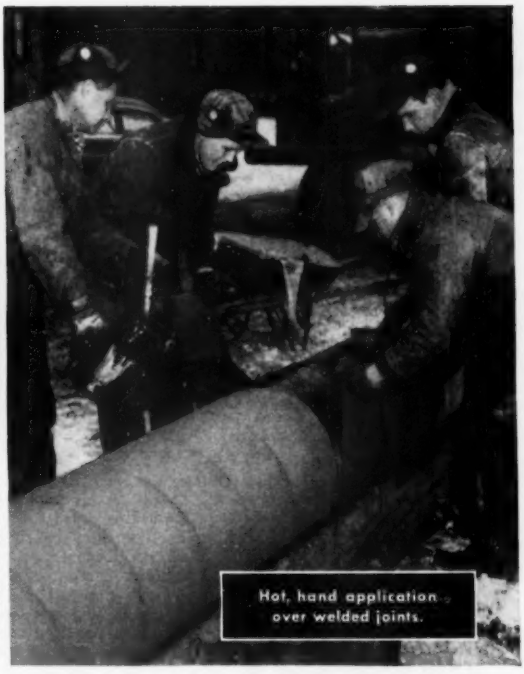
W. C. MacMillan, 56, senior vice president of Continental Oil Co., Houston, died of a heart ailment November 23 at Glendale, Calif. He joined the firm at Shawnee, Okla., more than 23 years ago, and rose through the ranks from an instrument man in the geological department to vice president in charge of production, assistant to the president, a company director, and then senior vice president. A native of Williamstown, Mass., MacMillan attended Brown University. He was named by Continental as vice president and administrative assistant to the president in 1949, and in February this year was elected senior vice president.

Roy L. Small, 52, supervising engineer for Standard Oil Development Co. at Linden, N. J., died November 22 in Elizabeth, N. J.

Carl H. Lutz, division superintendent of the southern dominion division for Dominion Natural Gas Co., Ltd., at Dunnville, Ont., Canada, died there November 18. He started with Cities Service Co. in Mansfield, Ohio, in 1917 and shortly thereafter was transferred to the Dominion company's headquarters in Buffalo, N. Y. He was appointed division superintendent at Dunnville in 1925.

Erik U. Garpner, 50, oil and mining consultant in the Mid-Continent for 22 years before moving recently to California, died November 25 in Los Angeles. At the time of his death he was consultant to Seismograph Service Corp.





NO-OX-ID RUST PREVENTIVE MATERIALS
add life time to pipe lines

For long-term, low-maintenance underground service, NO-OX-ID and NO-OX-IDized Wrappers can be applied by hand as shown above. This method is especially adapted to application over rough terrain, on short lines or congested areas and on field joints after welding.

COLD METHOD: A pliable, plastic, cold NO-OX-ID is rubbed on to 1/32" thickness.

NO-OX-IDized Wrapper is applied spirally as a shield, keeping the NO-OX-ID in intimate contact with the pipe—providing a tight seal against moisture and preventing abrasive damage. Then a final coating of NO-OX-ID is brushed on.

HOT METHOD: A length of NO-OX-IDized Wrapper is used as a granny rag to apply hot NO-OX-ID. The wrapper is then sealed to the coating around the pipe for permanent protection.

Consult your Dearborn Engineer for the NO-OX-ID combination and method of application best suited to protect your next pipe job.

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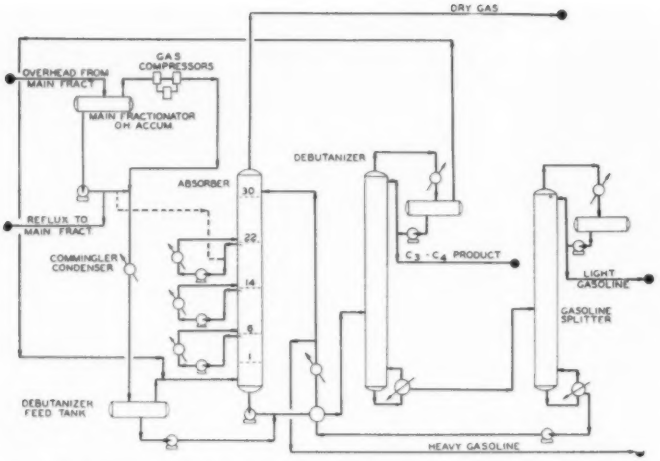

Fig. 1—Flow arrangement of catalytic cracking unit gas plant for moderate propane recovery. Solid lines indicate original design. Change in flow of lean-oil system to allow use of lighter oil is indicated by dotted line.

Included in this comprehensive discussion detailing most efficient engineering practices are:

1. How pressure and temperature affect extraction efficiency.

2. Deethanizing absorber will improve extraction efficiency.

3. What plant changes are needed for high propane recovery.

by

Forrest C. Gilmore*

and

Robert D. Bauer*

MODERN TRENDS IN

REFINERY-GAS EXTRACTION PLANTS

REFINERY-GAS extraction plants are usually of two general process types: compression and oil absorption. Practically all of the recent plants have been of the absorption type which has great advantages over the compression type when high propane-propylene extraction is desired.

Other processes which could be used for extraction include adsorption on activated charcoal and direct fractionation of the gas. The adsorption on activated charcoal appears to be suitable only for removing the last traces of propane-propylene from the residue gas of inefficient extraction units. Direct fractionation with refrigerated overhead condenser could in all probability be worked out satisfactorily process-wise and might be competitive with oil absorption for extremely high extraction efficiencies.

The oil-absorption plant is pretty definitely the most advantageous method of recovering between 70 and 90 per cent of the propane-propylene in the gases from a catalytic cracking unit. Oil-absorption plants can obtain a high recovery of propane in almost any range of operating temperatures and pressures. Low temperatures through refrigeration may be used in lieu of higher pressure or absorption-oil rate.

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Extraction Factors

Principal factors contributing to high extraction in an absorber are: (1) increase in pressure, (2) increase in the molal ratio of absorption oil to gas, (3) lower temperature of absorption, and (4) increased number of equilibrium stages i.e., theoretical trays.

Another factor in the over-all propane-recovery efficiency of the gas plant is the absorption of undesirable light fractions such as ethane and methane which usually must be removed from the gas-plant products and in the removal carry propane and propylene along with them. These gases can be recirculated through the absorber thereby adding to its gas load and requiring more absorption oil, a higher absorption pressure, or lower absorption temperature for the higher extraction necessary to obtain a net over-all propane-extraction efficiency. This in turn increases the extraction of undesirable light gases until a large and expensive recycle builds up. To avoid this to some extent, it is now becoming customary to add a rich-oil deethanizing section to the absorber below the feed, the rich oil being heated with a reboiler.

Obtaining High Propane-Propylene Recovery

The recovery of hydrocarbons from a gas in an absorber is a function of the absorption factor A defined by the following equation:

$$A = L/KV$$

where, A = absorption factor
L = mols per unit time of downflow oil
V = mols per unit time of upflow vapors
K = equilibrium constant of the component under consideration

Increasing the absorption factor, A, at a given set of operating conditions and fixed number of equilibrium steps, increases the absorption of the chosen component.

An analysis of the terms in the absorption factor equation leads to the following methods of increasing the extraction of gas components in the absorber:

1. Increase the molal oil rate by increasing the oil volume rate or by using a lighter absorption oil; (2) decrease the molal vapor rate by decreasing gas feed rate as a result of condensing more of it by means of greater cooling with or without commingling in the condenser with gasoline or by decreasing the recycling to the absorber of ethane and lighter gases previously absorbed; and (3) decrease the equilibrium constant "K" by absorbing at lower temperatures or higher pressures.

These three methods by which the absorption factor, A, can be increased are now considered in more detail.

Absorption-oil rate.—In designing a new oil-absorption plant the oil rate required for a specified extraction does not present the problems usually encountered in revamping an existing unit for higher propane recovery. In a new plant the absorber and subsequent towers and their auxiliary equipment may be sized to handle the required oil rates. However, increasing the oil rate in an existing unit to increase propane recovery may entail considerable changes in the mechanical design of existing equipment. If the existing absorber is operating at its liquid handling capacity, the effective oil rate can frequently be increased. This may be accomplished by altering the tray details and downcomers, using a lighter absorption oil thus obtaining more mols of downflow oil per barrel of liquid handling capacity or by both increase in the liquid handling capacity of the trays and the use of lighter absorption oil.

Debutanized gasoline and more recently unstabilized gasoline from the main condenser of the synthetic-crude tower of the catalytic cracking unit are principal absorption oils used in recently designed catalytic cracking unit gas recovery plants.

An example illustrates the advantage of using light absorption oil in a T.C.C. unit gas plant operating at 225 psig. This operation would require 60 per cent more barrels of the old-fashioned 200-molecular-weight absorption oil than unstabilized catalytic gasoline or 20 per cent more barrels of heavy catalytic gasoline than unstabilized catalytic gasoline to accomplish an 85 per cent propane-propylene recovery. The big advantage in using unstabilized catalytic gasoline over debutanized catalytic gasoline is that it completely eliminates the recycle stream of lean oil and thus to a large extent unloads the subsequent fractionating equipment.

Fig. 1 shows a flow diagram of a gas plant designed to recover about 60 per cent of the available propane from a catalytic cracking unit. The lean oil was a heavy catalytic gasoline of 350°-430° F. boiling range. It operated satisfactorily at the designed recovery efficiency and a decision was made to increase the propane-propylene recovery to the maximum amount that could be obtained by increasing the lean-oil rate.

With this original arrangement and capacity of the fractionation equipment the lean oil rate was found to be limited not by the liquid-handling capacity of the absorber but by the capacity of the debutanizer reboiler so that an increase in the lean-oil circulation of only about 10 per cent was obtained.

The piping change shown by the dotted line, Fig. 1, was made without shutting down the unit. This change permitted the use of unstabilized catalytic gasoline as lean oil with a stream of heavy catalytic gasoline over the top tray as sponge oil.

TABLE 1—EFFECT ON ABSORPTION OF MOLECULAR WEIGHT OF LEAN OIL (FROM OPERATING TESTS)

	Residue gas Mol %		
Component:	A	B	C
CO	1.0	1.5	1.3
CO_2	1.4	1.7	1.3
N_2	12.4	8.1	7.6
O_2	0.7	0.6	0.5
H_2	48.2	52.4	53.9
H_2S	1.2	1.5	1.3
C_1	17.7	15.4	15.9
$C_2^=$	2.5	4.4	3.1
C_2	7.4	6.8	5.4
$C_3^=$	3.9	4.1	2.8
C_3	2.9	2.5	1.9
C_4+	0.7	1.0	5.0
Total	100.0	100.0	100.0
Lean oil:			
Bbl. per hour	280	225	250
Molecular weight	155	117	117
°A.P.I. at 60° F.	36.9	54.2	54.2
Sponge oil:			
Bbl. per hour	0	50	0
Molecular weight		155	
°A.P.I. at 60° F.		36.9	
Pressure, psig.	140	140	140
Total fractionator reboiler, steam required, lb./hour	41,800	25,400	

Typical residue gas analyses and oil rates for these two types of operation are shown in Table 1. Column A shows the previous operation using heavy catalytic gasoline as lean oil and Column B shows the operation after the change was made. This table reveals that the residue-gas analyses of these operations are comparable as are also the total oil rates to the absorber. This indicates that, under the same total lean-oil rate to the absorber, the recovery is about the same. However, by this change, the total fractionator reboiler steam load was reduced 40 per cent.

In making the change the eight top trays of the absorber were taken over as a sponge-oil section with only 50 bbl. per hour over its trays. This means that residue gas B was actually obtained with fewer trays than residue gas A thus showing by actual operating data the advantage of using light absorption oil.

Calculations made on the changed type of operation with 200 bbl. per hour of unstabilized catalytic gasoline as lean oil and 200 bbl. per hour of heavy catalytic gasoline as sponge oil showed an increase in propane extraction to about 80 per cent. Calculations also showed that the load on the subsequent fractionation equipment would be considerably less than it was under the original 60 per cent propane-recovery operation.

Column C of Table 1 shows why it is important to have an adequate sponge-oil section when using light absorption oil. Since the gas leaving the top of the absorber is at its dew point and attains this condition by equilibrium contact with the sponge oil, it is evident that a heavy sponge oil is advantageous. This is because it will not only recover the components stripped out of the light lean oil by the gas but also will allow very little of itself to pass out in the residue gas. Catalytic gas oils, which can readily be obtained from and returned to the main fractionator of the catalytic cracking unit, are excellent sponge oils. However, if they are used it is best to have the sponge-oil section as a separate small absorber rather than as the top section of the main absorber in order to eliminate any possibility of contaminating the gasoline yield with the gas oil through a faulty trapout or leaky tray.

The principal advantages in using light absorption oil, in addition to increased absorption per barrel used are: (1) unloading of reboilers and coolers, (2) reduction in pumping costs, (3) elimination of the lean-oil still including expensive heat exchangers, heaters, condenser and lean-

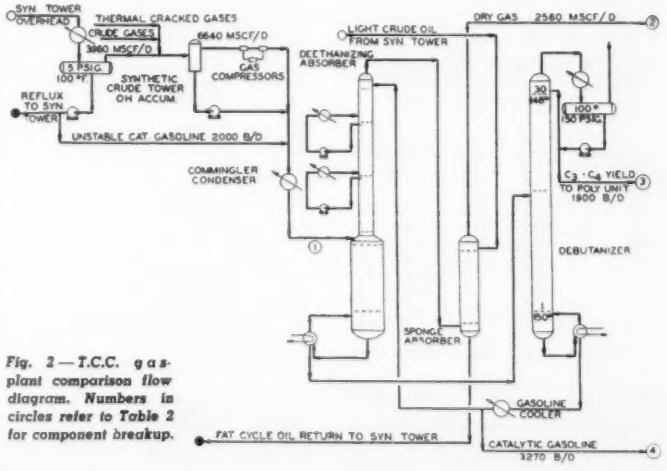

Fig. 2—T.C.C. gas-plant comparison flow diagram. Numbers in circles refer to Table 2 for component breakup.

oil coolers, compared with absorption oils heavier than gasoline.

Gas-feed rate.—Careful consideration should be given to lowering the volume of rich feed to the absorber by operating at the highest pressure consistent with the plant's ability and cooling the rich gas as nearly as practical to cooling-water temperature thus condensing as much of it as possible. It is probable that refrigeration of the catalytic cracking unit main condenser gas in commingling relation with the condenser liquid to between 40° and 50° F. is justified. This is because the lowered temperature will not only reduce the gas feed to the absorber but will also greatly decrease the gas volume to the gas compressors as well as increase the volume of unstabilized catalytic gasoline available as absorption oil.

Commingling of the compressed gases from a catalytic cracking unit with the unstabilized catalytic gasoline in a condenser will reduce the absorber feed gas volume. However, a more advantageous use of the unstabilized catalytic gasoline is to be had by using it for lean oil.

To those familiar with catalytic cracking, the residue-gas compositions shown in Table 1 indicate the unit is suffering from metallic poisoning of the catalyst. Metals in the gas-oil feed deposit on the catalyst converting part of it into a dehydrogenation catalyst resulting in the production of hydrogen and coke at the expense of gasoline yield. Thus it is apparent that one very desirable way of decreasing the gas volume charged to the catalytic cracking unit absorber consists in the elimination of this metallic poisoning of the cracking catalyst.

Another way of lowering the gas volume to the absorber, usually by about 5 to 7 per cent is by better stripping of the regenerated catalyst so that the very minimum amount of inert gases are allowed to enter the reactor and pass on into the gas-recovery system.

Elimination or lowering of any recycle gases to the absorber will result in more efficient recovery. For this reason it is advisable to operate the fractionation equipment following the absorber at the highest pressure and with the lowest temperature possible on the overhead condenser of the column and thus hold the recycle gas volume at a minimum.

means that a lowering of the absorption temperature would favor butane absorption while having little effect on ethane absorption and going to high pressures so greatly favors methane and ethane absorption that the elimination of these undesirable gases from the final products may become a serious problem.

To show the effect of various customary absorption processes, process designs were made of gas plants to process the combined gases from a T.C.C. unit, a thermal cracking unit, and a crude unit at absorption pressures of 60, 150, and 225 psig. The following premises were used for each of these calculations:

1. Recover 85 per cent of the available propane-propylene.

2. An absorber with a fractionating section below the gas-feed entrance to sufficiently deethanize the rich oil so that the L.P.G. propane from the depropanizer of a catalytic polymerization unit would need no further deethanization by utilizing the debutanizer overhead liquid stream.

The over-all material balance for each gas-plant design is the same, regardless of the operating pressure. This is shown on a molal basis in Table 2. Fig. 2 shows the process flow used for the plants and Table 3 the results of the calculations and the design data. It will be noted from these data that as the operating pressure is increased the differences between the plants begin to narrow. For example, differences in oil rates, heat duties, operating expenses, etc., are much greater between the 60 and 150-psig. cases than they are between the 150 and 225-psig. cases.

There appears to be little difference

How Pressure and Temperature Affect Extraction Efficiency

THE absorption formula shows the absorption factor of each component of the gas varies inversely as the equilibrium constant and since increased pressure or decreased temperature decreases the equilibrium constant they will also increase the extraction efficiency of the absorber. However, the equilibrium constants of the various components of the gas are not equally affected by changes in pressures and temperatures, those of the heavier hydrocarbons being affected relatively more by temperature changes and those of the lighter hydrocarbons being affected relatively more by changes in pressure. This

TABLE 2—MATERIAL BALANCE DATA FOR TCC GAS PLANT COMPARISON

	Mol per hour			
	(1)	(2)	(3)	(4)
Component:	Total* charge	Residue gas	Poly feed	Gasoline yield
Inerts	4.2	4.2		
H_2S	6.1	5.5	0.6	
H_2	91.7	91.7		
C_1	82.9	82.9		
C_2	59.6	56.7	2.9	
$C_2^=$	18.6	18.4	0.2	
C_3	84.2	8.2	76.0	
$C_3^=$	75.0	13.2	61.8	
C_4	92.1		90.1	2.0
$C_4^=$	72.9		71.4	1.5
C_5	119.6		3.1	116.5
C_6-350° e.p.	227.5			227.5
Total	934.4	280.8	306.1	347.5
M.s.c.f./D.		2,560		
Bbl./SD.			1,900	3,270

*Combined gases from T.C.C. unit, thermal unit, and crude unit plus all synthetic-crude tower overhead liquid.

TABLE 3—TCC GAS PLANT COMPARISON AT VARIOUS OPERATING PRESSURES

Operating pressure, psig.—	60	150	225
Propylene-propane recovery	85	85	85
Gas to compressors, M.s.c.f./D.	6,640	6,640	6,640
Compressor b.hp. requirement	550	940	1,125
Commingler condenser duty, M B.t.u./hour	4,130	5,550	6,000
Deethanizing absorber data:			
Top section diameter, in.	72	42	36
Bottom section diameter, in.	84	60	60
Rich gas feed, M.s.c.f./D.	4,340	3,330	2,540
Lean gas, M.s.c.f./D.	2,560	2,560	2,560
Gasoline lost to lean gas, B/D	43	23	20
Lean oil, B/D	12,910	3,700	3,380
Light cycle oil to sponge absorber, B/D	1,680	820	720
Gallons of lean oil/M.s.c.f. of total gas	87	31	25
Rich oil bottoms, B/D	18,080	8,870	8,550
Theoretical absorption trays	10	10	10
Average absorption temperature, °F.	100	100	100
Theoretical stripping trays	10	10	10
Average stripping temperature, °F.	160	165	200
Reboiler temperature, °F.	200	235	270
Intercooler duty, M B.t.u./hour	3,200	1,780	1,900
Reboiler duty, M B.t.u./hour	11,830	9,400	10,300
Per cent vaporization of total feed	50	35	30
Debutanizer data:			
Tower diameter, in.	84	60	60
Feed, B/D	18,080	8,870	8,550
Overhead—liquid, B/D	1,900	1,900	1,900
vapor, M.s.c.f./D	0	0	0
Bottom yield, B/D	3,270	3,270	3,270
Bottoms lean-oil recycle, B/D	12,910	3,700	3,380
Overhead condenser duty, M B.t.u./hr.	8,900	8,900	8,900
Reboiler duty, M B.t.u./hr.	22,870	12,300	10,400
Utilities:			
Steam— 75 psig., lb./hr.		9,900	11,500
250 psig., lb./hr.	27,900	15,000	12,700
Electric power, kw.-hr.	118	19	30
Cooling requirements, M B.t.u./hour	29,100	26,800	26,900
Estimated operating cost,* $/D	374	321	332

*Does not include labor.

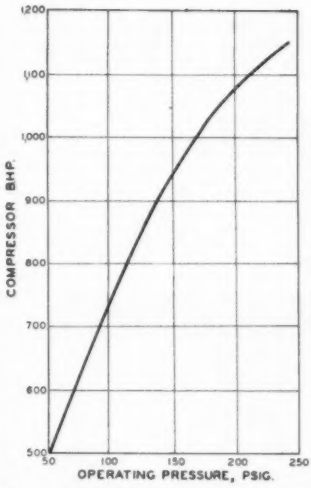

Fig. 3—Relationship between operating pressure and compressor brake-horsepower requirements.

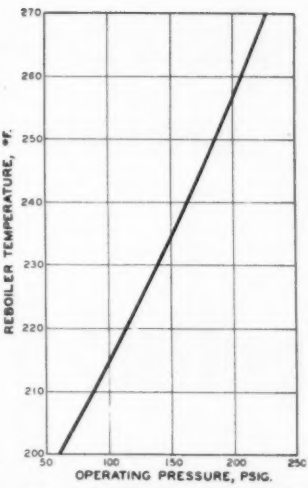

Fig. 4—Pressure vs. reboiler temperature plot for T.C.C. deethanizing absorber.

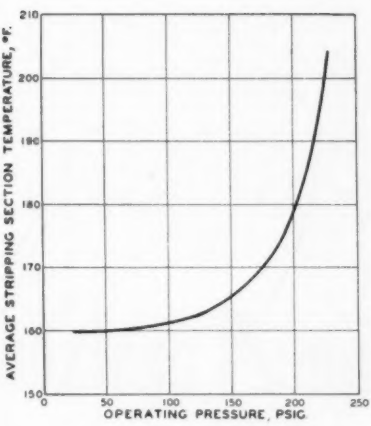

Fig. 5—Pressure vs. average stripping temperature in T.C.C. deethanizing absorber.

between the 150 and 225-psig. cases from the standpoint of equipment requirements for the absorber and debutanizer. One notable exception to this is the compressor-brake-horsepower requirement, which continues to increase fairly rapidly as the pressure is increased. The absorber-reboiler temperature and the average stripping-section temperature also increase with the operating pressure. These trends are shown graphically on Figs. 3, 4, and 5.

In Fig. 6, the required diameter of the absorption section is shown as a function of the operating pressure. The curve indicates that, under the conditions chosen for this problem, increasing the pressure decreases the diameter but at a diminishing rate.

In determining size of the columns for this comparison, the liquid and vapor loads were calculated. The vapor loading was determined at 100 per cent of the value given by the Brown and Souders mass-velocity equation and the tower sized for whichever load was the greater. The debutanizer and the absorption section of the absorber were sized for vapor loading while the stripping section of the absorber was sized largely for liquid loading, all bubble trays being of the conventional type.

This method of column sizing was used in order to take advantage of any possible savings in steel. Other savings in steel could probably be obtained by using some of the special new types of trays which their manufacturers claim would allow the tower diameters to be reduced.

Fig. 7 shows how the rich feed gas to the absorber may be decreased by compressing it to a higher pressure, and commingling it with the unstabilized catalytic gasoline while cooling to 100° F. However, this is an expensive method of decreasing the gas volume to the absorber because in going from 150 to 225 psig. the compressor horsepower is increased by 20 per cent while the gas volume decreases 15 per cent.

Fig. 8 shows loss of gasoline to residue gas as a function of operating pressure and indicates that operating at 150 psig. as compared to 60 psig. will save about $80 per day in gasoline losses. There is little difference between the gasoline lost by operating at 150 and 225 psig.

Fig. 9 shows lean oil required to obtain 85 per cent propane-propylene extraction as a function of total gas feed to the absorber and the operating pressure. This curve indicates that at pressures above 200 psig. the lean-oil requirement per thousand standard cubic feet of gas begins to level out. This behavior is also evident from the fact that the equilibrium constants of propane and heavier are increasingly sensitive to temperature changes as the temperature decreases below 150° F. and decreasingly sensitive to pressure changes as the pressure increases, especially for pressures above 200 psig.

Fig. 10 shows gas loads at various points in the deethanizing absorber. This figure shows that while operation at the higher pressure may

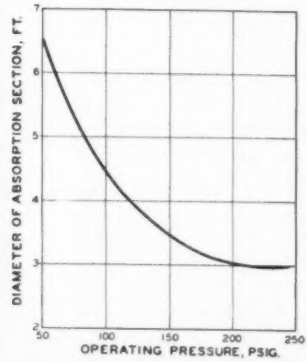

Fig. 6—Pressure vs. absorption section diameter, T.C.C. deethanizing absorber.

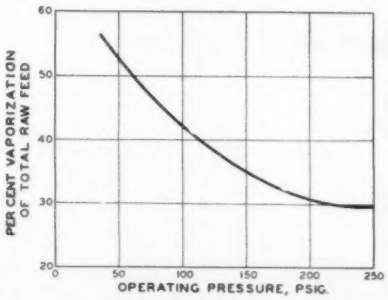

Fig. 7—Plot of pressure vs. condensation of raw feed gas in T.C.C. unit.

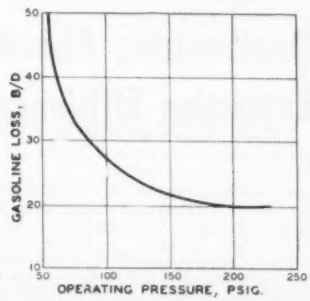

Fig. 8—Pressure vs. gasoline loss to dry gas from T.C.C. deethanizer.

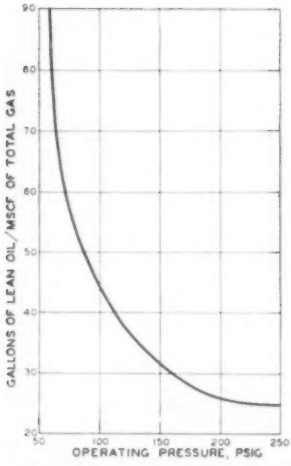

Fig. 9—Pressure vs. lean-oil rate. T.C.C. deethanizing absorber.

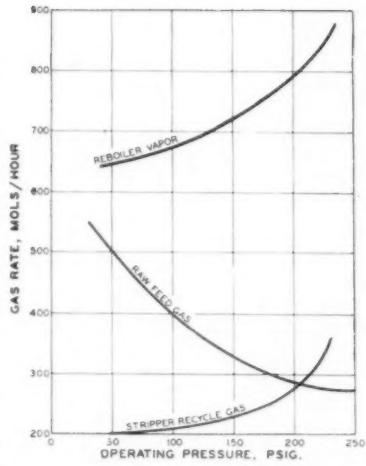

Fig. 10—Pressure vs. vapor rates. T.C.C. deethanizing absorber.

decrease the feed gas to the absorber, it will make the stripping operation for deethanization more difficult, consequently increasing the internal recycle vapors from the stripping section to almost the same extent the feed gas is decreased.

Based on the above it appears that the 60-psig. case, when using temperatures obtained by use of cooling-tower water, cannot be economically employed to the best advantage. This narrows the choice down to the 150 and 225-psig. cases, neither of which has any decided advantage over the other. The 150-psig. case appears to be nearer the optimum point on the curves and should cost somewhat less to construct and operate.

Table 4 shows a comparison between the previously described 150-psig. plant and a 150-psig. plant using butane refrigeration for cooling the lean oil and the absorber intercoolers to obtain an average absorption temperature of 50° F. Material balance is the same as for previous cases. The greatest saving by using refrigeration is in the lean-oil circulation which was reduced to about 70 per cent of that required in the plant without refrigeration.

Additional savings were obtained in reboiling steam and cooling-water costs while gasoline losses to residue were reduced to practically none. The 265 b.hp. required for refrigeration is a cost which is partially offset by savings in sizes of reboilers, condensers, coolers, and pumps. It seems that this application of refrigeration is justified by the saving in operating costs and reduction of gasoline losses to the residue gas.

While no detailed comparisons have yet been made, it may well be that the optimum pressure for 50° F. absorption is much lower than the 150 psig. used. Also, it may be that applying refrigeration to the main fractionator overhead condenser of the catalytic cracking unit would prove to be a more economical type of operation. Refrigeration greatly reduces gas to the compressor and to the absorber. This in turn supplies more unstabilized catalytic gasoline for lean oil so that no debutanized gasoline need be recycled for lean oil.

Deethanizing Absorber Will Improve Extraction Efficiency

IN any efficient absorption-type gas-recovery plant, removal of ethane and lighter absorbed components without loss of propane and propylene is a major problem. In plants operating with high propane recovery and without deethanization of rich oil, vapors from the subsequent fractionators must be reprocessed in either a reabsorber or returned to the main absorber to maintain high recovery of propane. By proper operation of a rich-oil deethanization scheme it is possible to operate the fractionators, such as depropanizers or debutanizers, with total condensation of their overhead products at ordinary plant temperatures and pressures. In this way costly and uneconomical flashing, recycling, recompression, and reabsorption operations may be eliminated.

In a recent article[1] the estimated cost of a gas plant using a novel rich-oil-stabilization scheme was quoted to be 15 per cent less than the most economical design that could be otherwise arrived at. Generally, in catalytic cracking unit gas plants it is not necessary to yield an L.P.G. stream as overhead from the depropanizer or debutanizer since the total overhead product from these fractionators is normally fed to some catayltic conversion process. However, if the feed stream to the conversion process is not deethanized it will be necessary to deethanize the propane effluent from such conversion process if it is to be used as L.P.G. If the conversion process is an HF alkylation unit it will be imperative to have an almost completely deethanized feed for it.

Elimination of ethane and lighter components is also desirable in order to lower pressure requirements on storage vessels and process equip-

TABLE 4—TCC GAS PLANT COMPARISON, 150 PSIG—WITH AND WITHOUT REFRIGERATION

	No refrigeration	With refrigeration*
Propane-propylene recovery	85	85
Operating pressure, psig.	150	150
Gas to compressors, M.s.c.f./D	6,640	6,640
Refrigeration compressor, b.hp.		267
Gas compressor b.hp. requirement	940	940
Total compressor b.hp.	940	1,207
Commingler condenser duty, M B.t.u./hr.	5,550	5,550
Deethanizing absorber data—		
Top section diameter, in.	42	42
Bottom section diameter, in.	60	60
Rich gas feed, M.s.c.f./D	3,330	3,330
Lean gas, M.s.c.f./D	2,560	2,560
Gasoline lost to lean gas, B/D	23	Negl
Lean oil, B/D	3,700	2,540
Light cycle oil to sponge absorber, B/D	820	820
Gallons lean oil/M.s.c.f. of total gas	31	21
Rich-oil bottoms, B/D	8,870	7,710
Theoretical absorption trays	10	10
Avg. absorption temp., °F.	100	50
Theoretical stripping trays	10	10
Avg. stripping temp., °F.	165	165
Reboiler temperature, °F.	235	235
Intercooler duty, M B.t.u./hr.	1,780	910
Reboiler duty, M B.t.u./hr.	9,400	5,000
Per cent vaporization of total feed	35	35
Debutanizer data—		
Tower diameter, in.	60	60
Feed, B/D	8,870	7,710
Overhead:		
Liquid, B/D	1,900	1,900
Vapor, M.s.c.f./D	0	0
Bottom yield, B/D	3,270	3,270
Bottoms lean-oil recycle, B/D	3,700	2,540
Overhead condenser duty, M B.t.u./hr.	8,900	8,900
Reboiler duty, M B.t.u./hr.	12,300	12,500
Utilities—		
Steam:		
75 psig., lb./hr.	9,900	
250 psig., lb./hr.	15,000	
340 psig., lb./hr.		20,900
Electric power, kw.-hr.	19	15
Cooling requirements, M B.t.u./hr.	26,800	21,500
Est. operating cost,† $/D	321	250

*Applied to lean oil and intercoolers only.
†Does not include labor.

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NO "KEEPER" NEEDED

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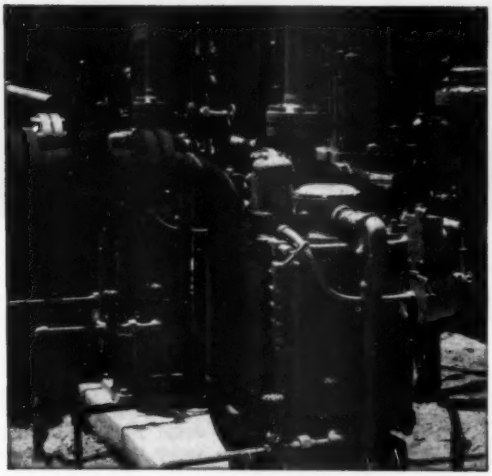

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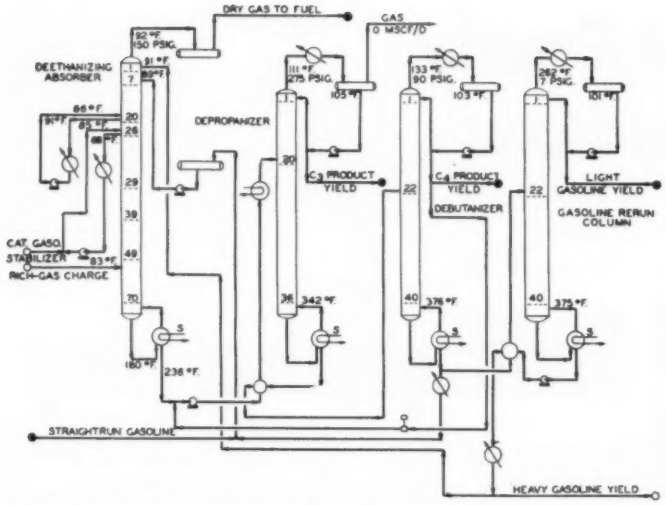

Fig. 11—Flow scheme of catalytic cracking unit gas plant with deethanizing absorber. Refer to Table 5 for material balance.

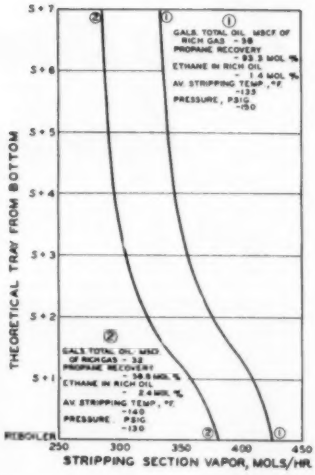

Fig. 12—Curves on vapor boil-up rates in deethanizing absorber.

ment. The fractionating absorber has proved satisfactory for use in conjunction with catalytic polymerization and L.P.G. production without subsequent deethanization of the propane.

Another advantage of the deethanizing absorber is in the rejection of a large percentage of the hydrogen-sulfide that would otherwise be recovered with high propane-recovery operation. Thus not only can a high recovery of propane and propylene with very little ethane contamination be obtained but also the corrosion troubles in the downstream process equipment and the cost of treatment of the C_3-C_4 stream can be lowered greatly by use of a deethanizing absorber.

The fractionating absorber has been defined[2] as a fractionating column in which reflux is generated by means of an absorption medium. In any such separation process it is necessary to have a stream of recycle or reflux material present in order to obtain the desired separation. In a fractionating absorber this reflux is supplied by the hydrocarbons dissolving in the absorption oil. A reflux of this type can be increased only by an increase in either the lean-oil circulation rate or by the over-all effect of those factors, such as temperature and pressure, governing the amount of absorption obtained.

Fig. 11 shows a catalytic cracking gas plant which utilizes an extremely efficient fractionating absorber in its scheme of operation. This plant employs a partially stabilized straight-run gasoline for lean oil and a heavy gasoline for sponge oil. Table 5 shows an actual material balance for the deethanizing absorber of this plant obtained by a test run when operating at a propane-propylene recovery of 97.8 per cent. Even at this extraordinarily high propane-propylene recovery it was possible to totally condense all of the depropanizer overhead vapor thereby eliminating this recycle gas stream. The ethane-ethylene content of the depropanizer overhead liquid was about 3.0 mol per cent which is suitable for catalytic polymerization feed stock but would require additional deethanization for

TABLE 5—MOLAL MATERIAL BALANCE FOR DEETHANIZING ABSORBER

Component:	Mol/hr. Stabilizer OH liquid	Rich gas	Lean oil	Sponge oil	Rich-oil bottoms	Dry-gas to fuel	Component recovery* mol %
CO		4.4				4.4	0
H_2		69.5				69.5	0
N_2		25.1				25.1	0
H_2S		4.3			2.3	2.0	53.5
CO_2		12.0				12.0	0
C_1		131.4				131.4	0
C_2=	7.1	25.9			1.5	31.5	4.6
C_2	14.1	50.5			5.5	59.1	8.5
C_3=	72.9	62.8			132.6	3.1	97.8
C_3	24.1	29.2	8.4		60.3	1.4	97.8
C_4=	75.6	30.2			104.3	1.5	98.6
iC_4	53.0	21.1	9.4		81.7	1.8	98.0
nC_4	9.6	5.0	14.1		28.2	0.5	90.0
C_5	62.8	22.8	29.9		115.5		100
C_6+			932.5	251.0	1,083.5		100
Total	319.2	494.2	994.3	151.0	1,615.4	343.3	
B/H	89		392	60	584		
M.s.c.f./D		4,490				3,120	
Absorption-oil data:							
°A.P.I.			50.2	43.1			
Initial boiling point, °F.			126	320			
10 per cent point, °F.			202	332			
50 per cent point, °F.			300	346			
90 per cent point, °F.			368	382			
End point, °F.			426	432			
Estimated molecular weight			124	140			

*Based on rich oil and dry gas.

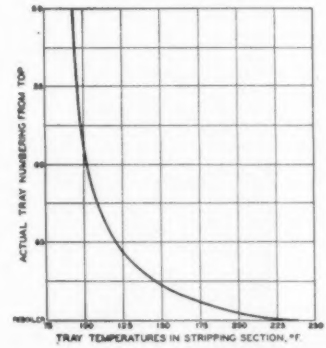

Fig. 13—Actual temperature gradient of stripping section in deethanizing absorber operating at 150 psig.

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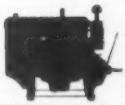

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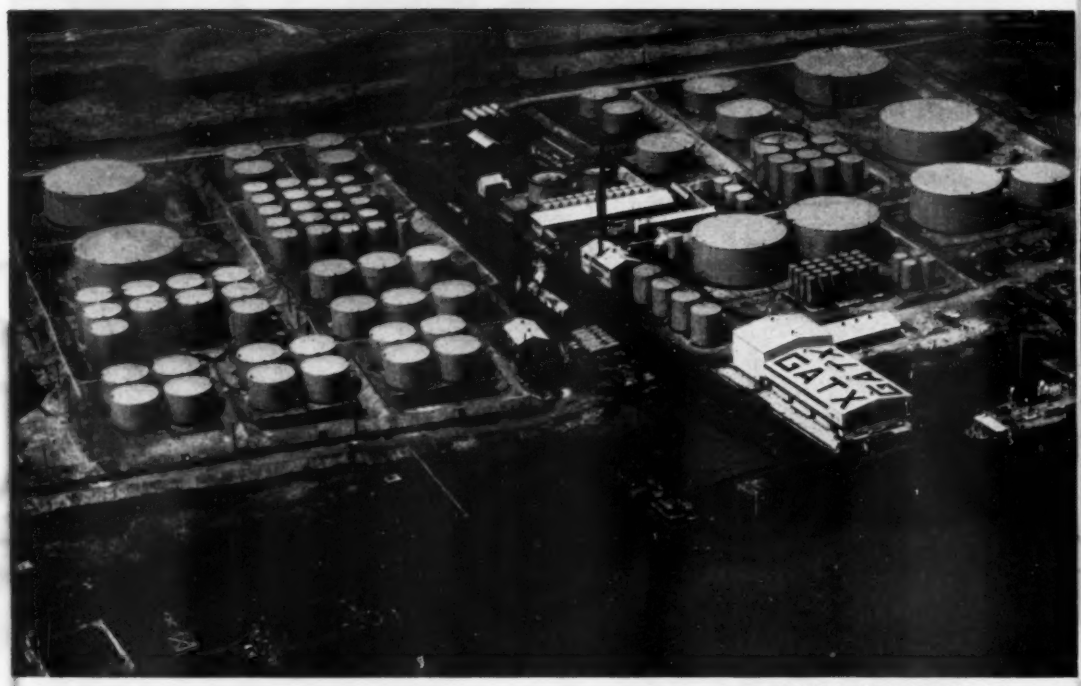

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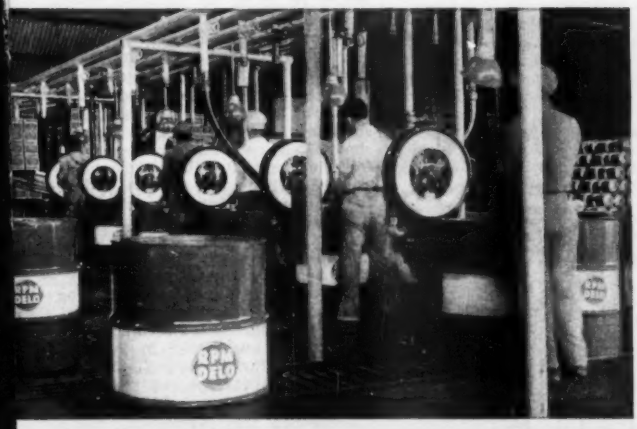

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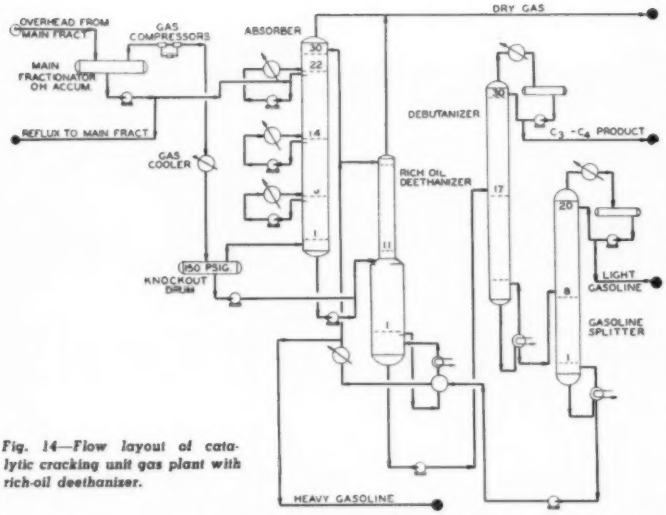

Fig. 14—Flow layout of catalytic cracking unit gas plant with rich-oil deethanizer.

TABLE 6—COMPONENT ANALYSIS AT VARIOUS TRAYS IN DEETHANIZER ABSORBER* OPERATING AT 150 PSIG.

	Mol per cent				
	Tray 65		Tray 59	Tray 28	Tray 20
Component	Liquid	Vapor	Vapor	Liquid	Liquid
C_1			0.3	0.8	1.3
$C_3^=$	9.4	51.9	6.2	0.9	2.0
C_3			53.8	5.9	7.2
$C_2^=$	15.2	27.4	22.1	8.1	3.1
C_2	5.9	9.3	6.2	3.4	1.2
$C_4^=$	4.2	2.8			
iC_4	8.0	6.2	10.5	13.4	2.5
nC_4	3.0	1.8			
C_5^-	1.5	0.4	0.9	1.9	2.0
C_5^+	52.8	0.2		65.6	80.7
Total	100.0	100.0	100.0	100.0	100.0
Tray temp., °F.	122			88	91

*Tower containing 70 trays, numbered from top.

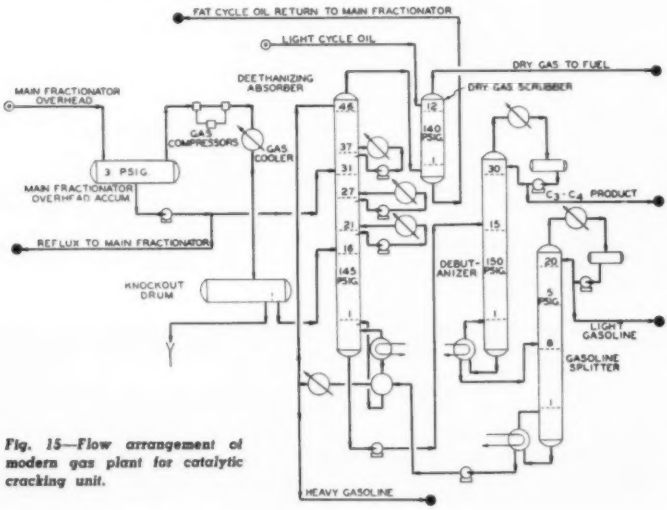

Fig. 15—Flow arrangement of modern gas plant for catalytic cracking unit.

use as L.P.G. or alkylation unit feed. However, there is no reason why this deethanizing absorber cannot be made to work a little harder to produce L.P.G. as the overhead liquid from the depropanizer.

Since the deethanization operation of the fractionating absorber is the most important factor in its use, it is well to take a brief look into the factors governing the extent of this deethanization. The main or controlling factor is the previously mentioned reflux or recycle material which makes the separation possible. In the deethanization step this reflux material is furnished by the reboiler and stripping-section vapors.

Fig. 12 shows the vaporization rates from the stripping-section trays at two different propane recoveries. These curves were calculated from the data of two test runs at conditions and recoveries shown. Both of these curves follow the same general trend and indicate that equal molal boilup is rapidly approached above the first four or five trays above the reboiler.

The two curves, Fig. 12, also show by their relative positions that a considerable increase in the stripping vapors is required to lower the mol per cent of ethane in the rich-oil bottoms from 2.4 per cent to 1.4 per cent for the conditions shown. These curves also show that as the propane recovery is increased the temperature required to do the stripping is slightly decreased. This may be explained by the probability that at the higher recovery figure, more propane is made available to supply the necessary refluxing, or recycling operation, while at the lower propane recovery figure, these recycle vapors will probably have to contain a relatively high percentage of butane.

Fig. 13 is a plot of the actual temperature gradient of the stripping section in the deethanizing absorber shown in Fig. 11, during the test run for the material balance shown in Table 5. It is evident from an inspection of the temperature gradient that the bottom 5 to 10 trays were doing most of the deethanization while the remaining trays were serving mostly as a heat-exchange section[1] thereby preventing stripping heat from passing into the absorption section. This behavior is in agreement with the data of Goldblatt and Nelly[1] in that the operation of the absorption section is apparently independent of stripping-section temperatures.

Theoretical tray calculations, based on the actual operation of the deethannizing absorber outlined in Fig. 11, show an average apparent tray efficiency for the bottom five actual stripping trays of about 80 per cent. These agree with the temperature gradient shown in Fig. 13 and the data of Fig. 12 in that the bottom 5 to 10 trays in the stripping section accomplish practically all the deethanization.

Table 6 shows stream-analysis data at various points in the deethanizing tower when operating at the conditions shown in Table 5. These data, while not conclusive enough to present any concentration gradients for the various components throughout the deethanizing absorber, do stimulate some speculations regarding possible future use of fractionating absorbers, such as the withdrawing of a vapor or liquid sidestream from some point of the deethanization section. A fairly concentrated ethane-ethylene or propane-propylene stream could be obtained in this manner for feed to a catalytic conversion process and thus eliminate several processing steps which might otherwise be required. Also by withdrawing such a vapor sidestream the absorber could be partially relieved of its vapor load thereby increasing propane extraction.

The operating expenses of a deethanizing absorber may seem somewhat high at first glance because the lean-oil rate may be 50 to 60 per cent greater than that to a straight absorber for the same propane recovery. A comparison between a deethanization absorber and a straight absorber, without a gas-recycle stream is sown in Table 7. In this comparison, about 58 per cent more lean oil is required for the deethanizing absorber to obtain the same initial propane recovery as in the straight absorber. However, the high oil rate required for the deethanizing absorber does not appear so excessive when compared with the extra cost of using a reabsorber or a high-pressure deethanizer with a straight absorber in order to maintain the initial high propane recovery and yield a propane stream of comparable quality. Also, the necessary recycling of the high-pressure deethanizer overhead gases to the straight absorber will require an increased oil circulation to maintain the same high propane extraction.

The lean oil to a deethanizing absorber may be said to function not only as the primary lean oil but also as the lean oil for the reabsorber and as reflux for a partial deethanizer. Consequently, the deethanizing absorber may combine the function of three towers into one tower and at a total oil circulation rate that is no greater than the combined oil and reflux rates for these separate towers.

What Plant Changes Are Needed For High Propane Recovery

FOR the most part the previous discussion has dealt with various methods of increasing or maintaining high propane-propylene recovery in oil-absorption plants. It is now advisable to briefly summarize how some of these schemes may be applied to revamp an existing unit to increase recovery of propane and propylene. A few obvious and easier methods which should be compared for the plant under consideration are listed below:

1. Increasing lean-oil circulation is perhaps the easiest single method of obtaining a higher propane-propylene recovery provided the absorber and subsequent fractionators, reboilers, and coolers are of sufficient size to handle this additional liquid load. Use of a lighter absorption oil is particularly beneficial when one of the factors listed above is found to limit oil circulation rate. The dotted line on Fig. 1 shows an easy method of obtaining light absorption oil for use over the absorber in a catalytic cracking unit. However, the use of a light absorption oil necessitates use of an adequate sponge-oil section to eliminate loss of gasoline hydrocarbons to the lean gas.

2. Maintaining a lower average absorption temperature by refrigeration of lean oils, feed gases, and intercoolers is an advantageous means of increasing the propane-propylene recovery in an existing plant, but its justification for a new plant is doubtful. However, if recovery of ethylene is desired, refrigeration will have to be employed in order to keep the lean-oil requirements within reason.

3. In some plants the absorption pressure can be increased but usually it will have to remain the same or be lowered. The latter possibility may be one reason why the initial recovery of propane and propylene has fallen off in catalytic cracking unit gas plants. Lowered operating pressure is brought about as the corrosion allowance of the equipment becomes less. For this reason some other method, rather than an increased pressure, must generally be used to achieve the desired recovery figure.

4. Reboiling of the primary absorber, when capaicty of the absorber will permit it, and converting the bottom 5-10 trays of the absorber to a deethanizing section may prove to be advantageous. These alterations to the primary absorber will make possible elimination of the gas stream which must be recycled either to the primary absorber or reabsorber, or disposed of as fuel. This lowers a possible source of propane-propylene losses.

5. If the existing absorber does not have sufficient liquid capacity to handle the increased lean-oil rate required for the fractionating absorber's operation, a separate rich-oil deethanizer may be used in place of the fractionating absorber. A rich-oil deethanizer allows the primary absorber to be loaded to its maximum liquid handling capacity and thus sets the maximum propane-propylene recovery obtainable as the deethanization of the rich oil is carried out in a separate column.

The absorber of the gas plant shown in Fig. 1 was found to be of the type mentioned above in that the liquid handling capacity of the absorber was the limiting factor. As a consequence this absorber could not be easily converted into a fractionating absorber. Fig. 14 shows how a rich-oil-deethanizing scheme was worked into the plan of operations for this plant. The absorber is to be loaded to its maximum liquid handling capacity thereby setting initial recovery of propane and propylene. The rich oil from the absorber is then deethanized in the rich-oil deethanizer with a minimum loss of propane and propylene to fuel gas.

The deethanization accomplished in the rich-oil deethanizer is sufficient so that the debutanizer overhead yield may be totally condensed at 125 psig., thus eliminating the previous recycle gas stream. Calculated recovery of propane for the unit, revamped as shown in Fig. 14, was 98.6 per cent. The degree of deethanization of the C_2-C_3 product stream while not enough for L.P.G. production or alkylation unit feed is satisfactory for its intended use as catalytic polymerization unit feed.

The following tabulation summarizes, for the original gas plant shown in Fig. 1, the calculated propane recoveries that would result from the revamped operations shown in Figs. 1 and 14.

	Propane recovery, mol. per cent
Original, Fig. 1	65
Revamped lean-oil system, Fig. 1	80
Rich-oil deethanization, Fig. 14	90

The exact choice as to which type or types of revamp to apply to a

(Continued on page 119)

TABLE 7—ABSORBER COMPARISON DATA AT 150 PSIG. OPERATING PRESSURE

	Absorber— Straight*	Absorber— Fractionating†
Net propane recovery, volume per cent	90.0	90.0
Theoretical absorption trays	10	10
Avg. absorption temp., °F.	110	110
Rich gas feed, mol/hr.	1,350	1,350
Lean gas to fuel, mol/hr.	636	723
Gas shrinkage, mol/hr.	714	627
Rich oil rate, mol/hr.	1,802	‡2,267
Lean oil rate, mol/hr.	967	1,523
Net absorption, mol/hr.	835	744
Propane in lean gas, mol %	5.3	4.7
Ethane and lighter in rich oil, mol %	4.7	‡0.2

*No recycle gas to absorber—i.e., same raw feed gas as fractionating absorber. †For production of L.P.G. ‡Kettle product.

That Spectacular Spraberry

A SYMPOSIUM ON WORLD'S LARGEST OIL FIELD—PART 2

Radioactivity Logs Define Lithology In the Spraberry Formation

by E. S. Mardock and Jack P. Myers
Well Surveys, Inc., Tulsa. Lane-Wells Co., Midland, Tex.

THE lithologic conditions prevailing in the Spraberry formation of West Texas necessitates a log giving maximum detail. The well-completion practices are such that a log must be capable of being run in oil or oil-base mud. It is also desirable to have a log indicating the productive porosity. Examples are presented here of several cored wells that have been logged with the "Extra Detail Radioactivity Curves."

General Description of Formation

The Spraberry sandstone is a lower Permian sandstone which occurs in the lower Leonard section and is generally restricted to the Midland basin province of the West Texas-New Mexico Permian basin. The total section is divided into three parts, the upper, the middle, and the lower.

Upper Spraberry.— Varying from 200 to 270 ft. in thickness this section consists usually of three fairly well developed sand bodies that can be correlated. Other sand lenses are developed with intervening argillaceous limestone and shale that cannot be correlated consistently.

Middle Spraberry.—This section is predominantly composed of shale with some development of standstones and limestones in the middle. The sands developed here can often be correlated within a field, but as a rule, they cannot be correlated throughout the Spraberry trend.

Lithology of the lower section is similar to that of the upper section, but the sandstone members are usually four in number, and can be correlated in the Spraberry trend. The lower section is usually considered to be 250 ft. thick.

The Spraberry sandstone is probably best described as a calcareous sandstone grading into an argilla-

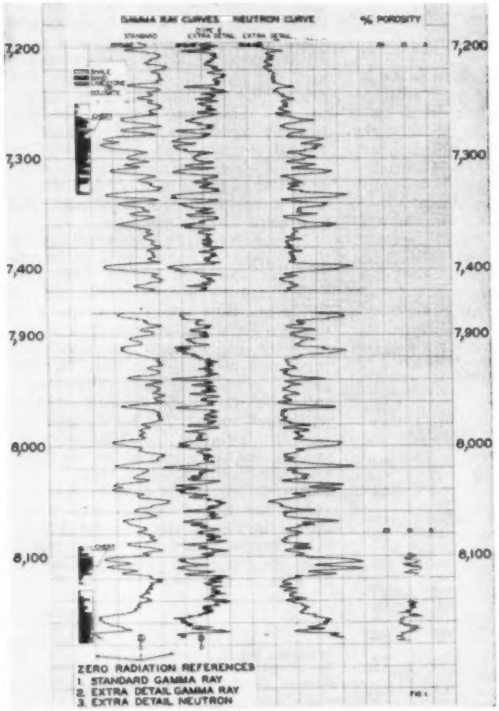

Fig. 1—Radioactivity logs and core data. Humble Oil & Refining Co. B-1 Shackelford, South Midkiff field, Upton County, Texas.

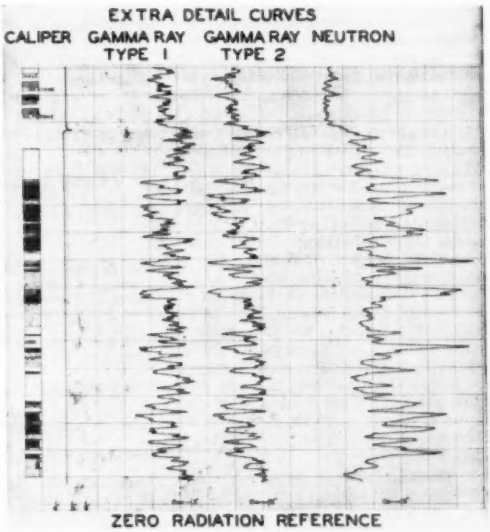

Fig. 2—Radioactivity logs and core data. Magnolia Petroleum Co. 9 O'Daniels, Tex-Harvey field, Midland County, Texas.

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THE VILLAIN— Cement.

OUR HERO— **SMENTOX**

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★ **SCENE II** — it meets Cement (that dirty villain) and becomes contaminated.

★ **SCENE III** Look at the poor stuff now—plastic, unpumpable, apparently ruined and about to be thrown out—

★ **SCENE IV** — when along comes SMENTOX (loud applause) who knocks out the villain, Cement.

★ **SCENE V** Now look at the same mud with SMENTOX added. By Gad, sir—it's even better than it was before.

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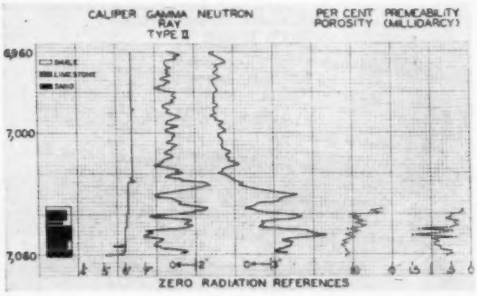

Fig. 3—Radioactivity logs and core data on Atlantic Refining Co. 2 Schrock (Sec. 22), Driver field, Midland County, Texas.

ceous or shaly sandstone that is medium to very fine grained and varies from gray to brown in color. The effective porosity of the sandstone ranges from 2 to 19 per cent and permeability varies from 0 to 2 md. Argillaceous limestone and shale varying from gray to brown to black in color is found interbedded with the sandstone. It is not uncommon to find laminations of sandstone and shale ⅛ in. thick interbedded.

Lower Spraberry. — The sandstone members of this section are generally thicker than the sandstone members of the upper Spraberry. The Spraberry formation contains many vertical fractures which have been described in other papers and will not be discussed here.

An average thickness of 2 ft. was found for the sand bodies in the wells studied, and the majority of these sand bodies were over 1 ft. in thickness.

For specific information on the Spraberry sand, reference is made to several articles in the literature.[1,2,5]

Well-Completion Practice

Casing programs used in the Spraberry trend are varied depending on the operator, but by far the most popular procedure is to set casing at or near the top of the sandstone. A small percentage of the wells have been completed by setting pipe through and perforating, and in some cases, such as in Benedum field, wells have been drilled deeper and pipe set with a later plugback and completion by means of perforations opposite the Spraberry.

Drilling of the pay section may be accomplished by means of conventional rotary tools, or drilling in with a reverse-circulation unit, or drilling in with cable tools. Some operators prefer to make hole by coring with a diamond core barrel but they are in the minority. A comparatively new idea being used by a few operators in drilling the section is the use of fluid-control jet subs in a string of drill pipe. The principal advantages resulting from this system are the reduction of lost-circulation problems and the great reduction in the pressure of the drilling fluid on the formation. Various types of completions have been used such as acid, shooting with nitroglycerin, Hydrafrac, and shooting prior to Hydrafrac.

In most instances, a low-water-loss mud is used to drill to the casing point because of lost-circulation zones and the pay is drilled or cored with oil, oil-base mud, or sometimes oil-emulsion mud.

Choice of Logging Methods

From the foregoing it appears that both the lithologic conditions prevailing within the Spraberry sand section and the wide use of nonconducting drilling fluids impose restrictions on the choice of logging methods.

Electrical methods which have found wide application to similar lithologies are handicapped by the use of a nonconductive well fluid. It would appear quite natural, therefore, to investigate the applicability of radioactivity-logging methods to the conditions prevailing in Spraberry wells. This is because these methods possess basic advantages which specifically recommended them to those situations in which the productive formations occurs in thin layers interbedded with shale and where a nonconductive fluid fills the bore hole. The independence possessed by radioactivity curves with respect to the type of mud fluid used has been appreciated by the industry for some time. However, the advantages possessed by these methods of logging for differentiating thin layers has generally escaped notice by the industry as a whole, particularly with respect to sandstones.

In limestones and dolomites the success of the quantitative application of the neutron curve can be attributed in a great measure to its ability to resolve the small localized areas of porosity situated within the immediate environment of the subsurface instruments during logging and the industry is now aware of this application.[4,6,7]

Briefly stated, the high resolving power of radioactivity logs arises from the fact that no geometrically extensive energy field is required. The gamma ray curve, for example, measures the gamma radiation emitted by the various strata traversed by the bore hole and its power of resolution is limited mainly by the effective length of the gamma-ray detector. That is, the shorter the detector, the greater the resolution. However, the resolving power cannot be increased indefinitely by shortening the detector because another limiting factor appears when very short-length detectors are being considered, viz., the bore-hole diameter. That is to say, a detector 12 in. in length has three times the resolving power of a detector 36 in. in length, as long as the hole diameter is much smaller than the detector length in each case. However, a detector 4 in. long would not possess a resolving power three times greater than a detector 12 in. long unless the bore-hole diameter is less than 4 in.

In one experiment a detector 4 in. in length was compared with a detector 9 in. in length in a bore hole 6 in. in diameter. The log produced by the short detector had only slightly better resolution than that produced by the detector 9 in. in length. For making a gamma-ray log, therefore, it would appear that from the practical considerations of instrument design and the diameter of the bore holes encountered, the maximum resolution might be attained with an effective detector length of the order of 9 in.

The resolution of the neutron curve is likewise affected mainly by the length of the detector. The effective detector length commonly used for running neutrol curves is approximately 9 in. The resolving power of the neutron curve is sufficient to precisely differentiate strata for a minimum thickness of approximately 12 in. and it can detect much thinner layers if there is sufficient contrast.

(Note: The foregoing discussion presumes that the logging speed is below the level at which the resolution is affected by the time constant.)

Presence of extremely thin sand beds in the Spraberry has resulted in the introduction of two new radioactivity curves which have been called extra-detail curves, i.e., the extra-detail gamma-ray curve and the extra-detail neutron curve. The extra-detail gamma-ray curve is made with a gamma-ray detector chamber approximately 9 in. in effective length instead of the 30-in. chamber used with the standard equipment. The neutron curve is made with a specially shielded ionization chamber 9 in. in length and at a reduced source-detector spacing.

Logs made with this equipment are compared with lithologic data in Figs. 1 to 3. It is believed that the illustrations are sufficiently self-explanatory that they need very little help from the text. However, a further word of explanation might be required to explain the Type 1 and Type 2 gamma-ray detectors. Their behavior is almost identical except that the Type 2 detector was found

to be statistically superior to the Type 1 and therefore was adopted as the detector for the extra-detail gamma-ray curve.

In all the comparisons made between core data and the logs it was found that although porosity might be encountered in the shale as well as the sandy portions of the section, permeability was only encountered in the sands.

In general, the extra-detail gamma-ray curve differentiates the clean sands from the shale and shaly sands. However, the gamma-ray curve alone will show the shaly sands as shales and for this reason the extra-detail neutron curve is required. It is believed that the combination of the extra-detail neutron curve with the extra-detail gamma-ray curve provides the best means for estimating the net sand thickness of the section.

Quantitative Application

It is unfortunate that the development of quantitative radioactivity logging methods for sandstones has lagged behind those used in limestones and dolomites. However, some advances have been made within the last 2 years in specific formations of eastern Venezuela, East Texas,[4] and in certain Mid-Continent formations.

The quantitative application of radioactivity logs to the Spraberry was handicapped by the failure of the standard logs to portray accurately the true lithology of the section. The extra-detail curves now have provided a great improvement in this respect and it was considered desirable to examine the new curves to determine their applicability to quantitative interpretation methods. This was done for the two wells studied for which complete core-analysis data were available.

As has been previously explained[5] the quantitative application of the neutron curve for the determination of porosity is possible only if the effect of shale on the neutron curve may be compensated for and there are no other factors affecting the neutron curve excepting shale and liquid-filled porosity. In this event it may be possible to use the gamma-ray curve to correct the neutron-curve interpretation for the effect of the shale.

The following procedure was adopted to test the applicability of quantitative interpretation methods to the Spraberry formation.

First, the radioactivity curves and the core data are correlated and a composite plot prepared. The respective gamma-ray curve and neutron curve deflections are then determined for each depth interval and plotted in Table 1 for which a porosity value was available. These deflections are then converted to "standard units"

TABLE 1—COMPARISON OF RADIOACTIVITY CURVE DEFLECTIONS AND POROSITIES FOR THE HUMBLE B-1 SHACKELFORD, SOUTH MIDKIFF FIELD, UPTON COUNTY, TEXAS

Depth (ft.)	D_g (in.) sens. 12.7 in.	D_g standard units	D_n (in.) sens. 3.8 in.	D_n standard units	Per cent porosity P_t	P_{ps}	P_s $(P_{ps} - P_t)$
8,099	3.16	0.25	4.35	1.14	10.9	15.2	+4.3
8,100	2.92	0.23	4.50	1.19	6.7	14.0	+7.3
8,101	3.04	0.24	4.70	1.24	8.5	12.9	+4.4
8,102	2.00	0.16	6.10	1.60	9.5	7.1	−2.4
8,103	2.03	0.16	6.70	1.76	9.6	5.5	−4.1
8,104	1.90	0.15	7.00	1.84	9.0	4.8	−4.2
8,105	2.10	0.17	7.23	1.90	5.3	4.3	−1.0
8,106	2.30	0.18	6.50	1.71	6.4	5.9	−0.5
8,107	3.10	0.24	5.80	1.53	6.7	8.0	+1.3
8,108	2.50	0.20	5.07	1.34	13.4	10.9	−2.5
8,109	1.71	0.13	5.70	1.50	12.1	8.4	−3.7
8,110	1.80	0.14	6.65	1.75	6.0	5.5	−0.5
8,111	2.00	0.16	7.23	1.90	4.9	4.3	−0.6
8,112	2.15	0.17	6.60	1.74	5.6	5.6	0
8,113	2.70	0.21	5.50	1.45	5.1	9.1	+4.0
8,114	3.18	0.25	4.83	1.22	10.0	13.3	+3.3
8,115	2.30	0.18	5.20	1.37	9.1	10.4	+1.3
8,116	2.00	0.16	6.06	1.60	12.0	7.1	−4.9
8,117	2.70	0.21	5.60	1.47	6.1	8.8	+1.7
8,118	3.95	0.31	4.20	1.10	8.0	16.3	+8.3
8,142	3.81	0.30	4.15	1.09	8.5	16.4	+7.9
8,143	3.40	0.27	4.45	1.17	6.5	14.4	+7.9
8,144	3.55	0.28	4.50	1.18	10.6	14.2	+3.6
8,145	2.80	0.22	4.70	1.24	9.7	12.8	+3.1
8,146	3.16	0.25	4.83	1.27	9.2	12.2	+3.0
8,147	2.79	0.22	4.60	1.21	9.5	13.5	+4.0
8,148	3.28	0.26	4.60	1.21	9.3	13.5	+4.2
8,149	3.00	0.24	4.50	1.18	9.8	14.2	+4.4
8,150	3.25	0.26	4.50	1.18	10.8	14.2	+3.4
8,151	3.04	0.24	4.40	1.16	9.0	14.7	+5.7
8,152	2.60	0.20	4.70	1.24	15.0	12.8	−2.2
8,153	2.55	0.20	5.10	1.34	8.7	10.9	+2.2
8,154	2.12	0.17	5.10	1.34	6.5	10.9	+4.4
8,155	2.20	0.17	5.20	1.37	6.5	10.3	+3.8
8,156	1.70	0.13	5.60	1.47	10.8	8.8	−2.0
8,157	2.00	0.16	5.80	1.52	13.0	8.1	−4.9
8,158	1.81	0.14	5.60	1.47	12.4	8.8	−3.6
8,159	2.08	0.16	5.55	1.46	14.1	8.9	−5.2
8,160	1.95	0.15	5.50	1.45	14.2	9.1	−5.1
8,161	2.32	0.18	5.54	1.43	13.5	9.4	−4.1
8,162	2.20	0.17	5.60	1.47	15.0	8.8	−6.2
8,163	2.60	0.20	5.15	1.36	10.6	10.5	−0.1
8,164	3.22	0.26	4.76	1.25	13.0	12.7	−0.3
8,165	2.26	0.18	5.30	1.39	6.9	10.0	+3.1
8,166	3.00	0.24	5.30	1.39	9.6	10.0	+0.4
8,167	3.72	0.29	4.40	1.24	9.5	12.9	+3.4
8,168	4.05	0.32	4.35	1.14	8.4	15.2	+6.8
8,169	2.16	0.17	5.35	1.41	11.3	9.7	−1.6
8,170	1.70	0.13	6.00	1.58	10.6	7.3	−3.3
8,171	1.80	0.14	5.90	1.55	13.4	7.7	−5.7
8,172	2.05	0.16	5.90	1.55	13.4	7.7	−5.7
8,173	End of log		6.05	1.59	14.0	7.2	−6.8
			End of log				

TABLE 2—COMPARISON OF RADIOACTIVITY CURVE DEFLECTIONS AND POROSITIES FOR THE ATLANTIC 2 SCHROCK SECTION 22, DRIVER FIELD, MIDLAND COUNTY, TEXAS

Depth (ft.)	D_g (in.) sens. 7.3 in.	D_g standard units	D_n (in.) sens. 3.2 in.	D_n standard units	Per cent porosity P_t	P_{ps}	P_s $(P_{ps} - P_t)$
7,037.5	2.25	.38	2.6	.815	2.6	25.0	+22.4
7,038.5	2.0	.274	2.65	.83	5.2	24.5	+19.3
7,039.5	1.7	.233	3.1	.97	2.6	19.0	+16.4
7,040.5	1.1	.151	3.6	1.125	10.8	15.6	+4.8
7,041.5	1.9	.26	3.75	1.17	8.2	14.0	+5.8
7,042.5	1.85	.253	3.3	1.03	9.8	18.3	+8.5
7,043.5	1.8	.246	2.8	.875	6.8	22.0	+15.2
7,044.5	1.7	.233	2.85	.89	9.2	21.7	+12.5
7,045.5	1.9	.26	2.8	.875	6.8	22.0	+15.2
7,046.5	1.75	.24	2.75	.86	7.8	23.5	+14.7
7,047.5	1.0	.137	3.7	1.15	11.2	15.0	+3.8
7,048.5	.80	.109	3.95	1.23	8.2	13.0	+4.8
7,049.5	.90	.123	4.15	1.29	10.6	11.6	+1.0
7,050.5	.70	.096	4.4	1.37	11.8	10.0	−1.8
7,051.5	.90	.123	3.7	1.15	9.8	15.0	+5.2
7,052.5	1.15	.157	3.35	1.04	11.3	17.8	+6.5
7,053.5	1.1	.151	3.4	1.06	12.5	17.4	+4.9
7,054.5	1.0	.137	3.6	1.12	11.6	15.8	+4.2
7,055.5	.95	.13	3.55	1.11	12.8	16.0	+3.2
7,056.5	1.1	.151	3.4	1.06	12.4	17.4	+5.0
7,057.5	1.65	.226	3.15	.984	12.0	19.0	+7.0
7,058.5	1.75	.24	3.15	.984	11.6	19.0	+8.4
7,059.5	...	...	...	...	11.0	...	...

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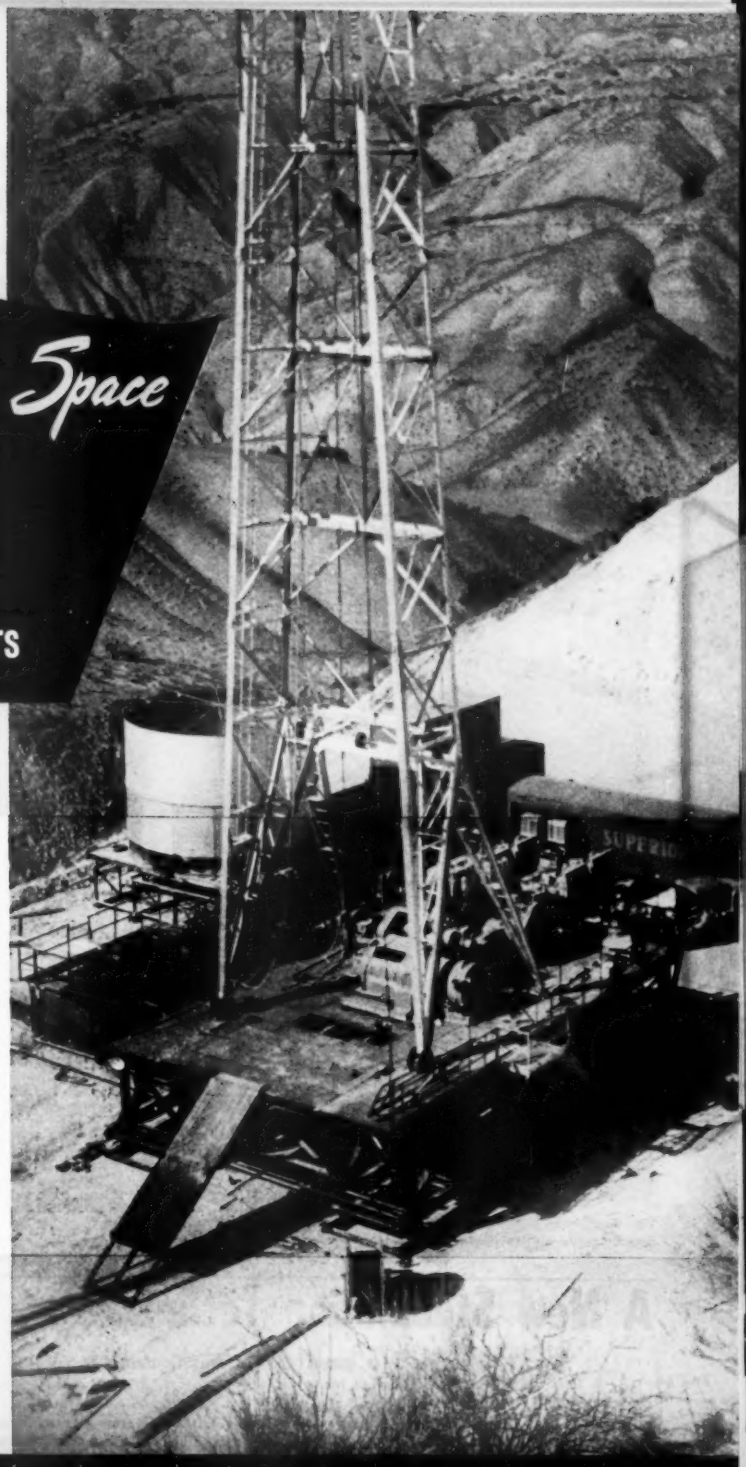

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by dividing by the appropriate sensitivity reading.[5,6]

A pseudo neutron-derived porosity calibration chart is then prepared showing neutron-curve deflections plotted against pseudo neutron-derived porosities. This is prepared by assuming that the relationship between the pseudo porosity (the pseudo porosity is the sum of the effects on the neutron curve due to both shale and liquid-filled porosity) and the neutron-curve deflection will be similar to that found for liquid-filled porosity alone. This is accomplished by drawing a straight line on semi-log paper as shown by Fig. 4.

The pseudo porosity corresponding to each neutron-curve deflection is then read off this calibration chart and recorded in Table under P_{ps}.

The "subtractive porosity" or the porosity effect on the neutron curve due to shale is then determined by subtracting the "true porosity" (the porosity determined from core analysis) from the "pseudo porosity" and this value is recorded in the table under P_s.

The gamma-ray curve deflections are then plotted against the corresponding values of P_s. The result of plotting the data from the Humble Oil & Refining Co. B-1 Shackelford, South Midkiff field, Upton County, Texas, are shown in Fig. 5.

Table 2 and Fig. 6 show similar data for the Atlantic 2 Schrock Section 22, Driver field, Midland County, Texas.

The fact that a relationship actually exists is quite apparent and it is encouraging that the two curves shown in Figs. 5 and 6 have the same slope. In fact, the principal difference between the two curves seems to be the location of "zero" on the P_s index.

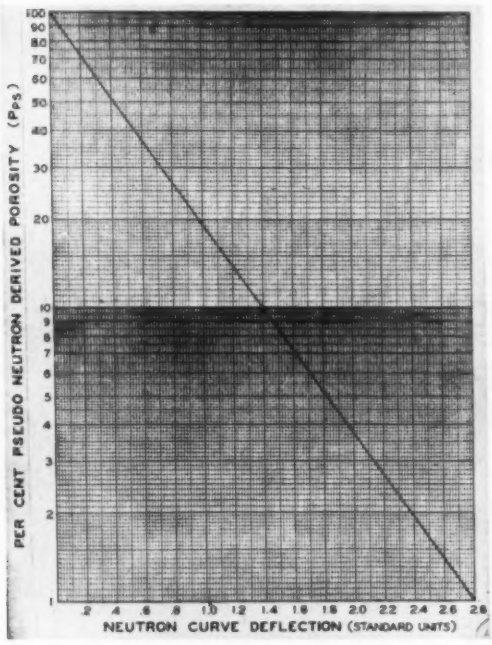
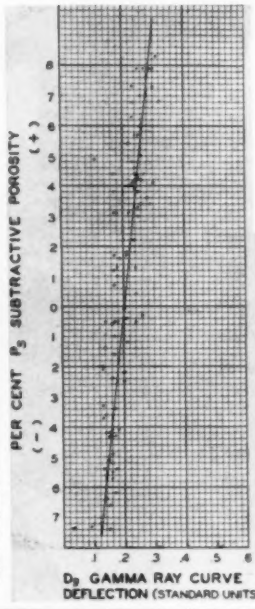
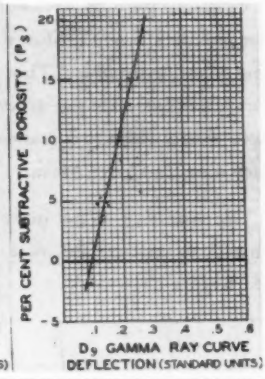


Fig. 4—Pseudo neutron-derived porosity calibration chart, showing neutron-curve deflections plotted against pseudo neutron-derived porosities.





Figs. 5, 6—Gamma-ray curve deflections on Atlantic 2 Schrock (Sec. 22), Driver field, Midland County, Texas. Fact that relationship actually exists is apparent; note that the two curves have the same slope.

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A New Stimulation Technique

by J. M. Moore and J. C. McCormick
Dowell Incorporated.

DURING the past few months a new technique of well stimulation has been used on a number of wells in the Greater Spraberry area of Texas. The process utilizes an acid-kerosine gel which acts as a mechanical agent to extend existing fractures or to form new ones, and serves as a solvent for calcareous materials or silicates present in the fractures or on the walls of the fractures.

As a preface to a description of this new technique let us briefly review some of the generally accepted knowledge concerning the Spraberry formation. These data have considerable bearing on the choice of the technique and the agents used in the treatments.

First, core data do not show the true condition of the Spraberry reservoir. This is because they are based primarily on the matrix and do not show the porosity and permeability due to the fractures. According to some recently published data, the average po-

rosity of a group of cores ranged between 2.5 and 15.8 per cent. Permeability ranges from 0.1 to 5.5 md. with an average of approximately 0.5 md. But, calculations based on productivity indexes indicate an average permeability of 6.5 md. This is about 14 times that indicated from the core sample data and so it is assumed to be due to the presence of fractures in the formation.

Some engineers have estimated that 95 per cent of the production from the Spraberry reservoir can be credited to the fractures. This, in spite of the apparent paradox that 0.35 per cent of the storage capacity is due to the fractures and 99.65 per cent due to the matrix. Such a storage capacity of the matrix as compared to the fractures suggests a stimulation technique which will open up the natural fractures in the formation and make new fractures. This is to increase the area for drainage from the matrix through the fractures into the well.

Further evidence of the fracturing (either natural or induced) is proven by the loss of drilling fluid when the formation is penetrated. Evidence of the extent of vertical fractures has been proven by cores taken from the formation after casing has been set and cemented. In many instances the almost vertical fractures in the core will be filled with drilling fluid, lost-circulation materials, or cement. One core having cement in the fracture was taken 90 ft. below the casing seat.

Some operators believe that it is detrimental to a well's production if either water or mud in any form is allowed to come in contact with the formation. This is because of the possibility of plugging the flow channels of the fractures and sealing off of the drainage from the matrix. To prevent this, the formation is often drilled using cable tools. If a rotary completion, oil-base mud, oil-emulsion mud, or crude oil is used as the drilling fluid.

There is apparent agreement that no gas cap exists and that the reservoir is gas saturated now and probably was originally. Also, there is probably no water drive. Bottom-hole pressures are lower than would normally be expected at this depth.

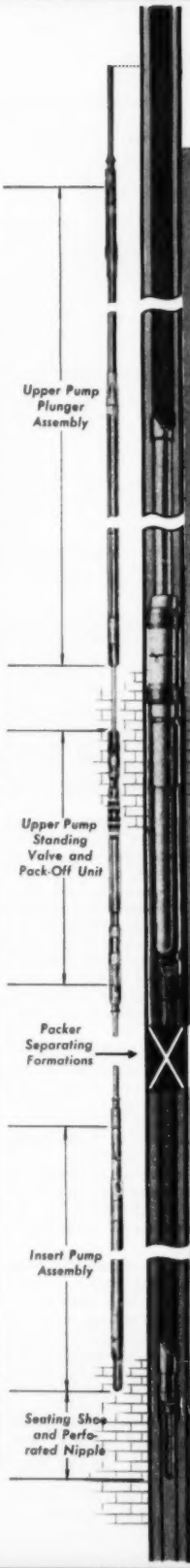
In many instances calcite or other calcareous materials have been found on the fracture walls. Petroleum residue has also been identified. X-ray analyses of two samples taken from cores of the same well show:

		Per cent
Sample No. 1 (Matrix)	Alpha quartz—SiO_2	70
	Dolomite	15
	Amorphous silicates	15
Sample No. 2 (Matrix)	Alpha quartz—SiO_2	70
	Illite	20
	Feldspar-type minerals	10

An analysis of the fracture-filling material shows:

		Per cent
Sample No. 3 (Fracture filling)	Alpha quartz—SiO_2	40
	Salt—Na CL	30
	Silicates	30

A crystalline material found in


Upper Pump Plunger Assembly
Upper Pump Standing Valve and Pack-Off Unit
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Insert Pump Assembly
Seating Shoe and Perforated Nipple

THE OTIS TWO-ZONE PUMP for dually-completed wells is an assembly of two sub-surface pumps which operate simultaneously on a single sucker rod string. The pumps work in conjunction with a pack-off unit in a special cross-over packer to produce the upper zone through the tubing and the lower zone separately through the tubing-casing annulus. The pump assembly illustrated (Type C) consists of a tubing pump to produce the upper zone and a rod (insert) pump for the lower zone. Both formations are pumped in the conventional manner, the same as in a single-zone well, and at no time do the fluids commingle. Operation of the second pump does not require an additional pumping unit, stuffing box, polished rod, or special surface fittings, nor does it increase the rod and engine load appreciably.

Pumping two-zone wells with this equipment is practicable and profitable because there are no complex production principles or costly maintenance problems. During the past few years, a large number of these pump assemblies have been installed in many different types of dually-completed wells throughout the Mid-Continent area.

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Well	Area: Field, county	Amount of Jel (gal.), Sand (lb.)	Results
A	Midkiff Midland	4,000 Jel X 3,000 Sand 1,350 psi. 2.2 B/M	(Pot. 215+ BOPD) 41 ft. of cable-tool hole. Casing swabbed 3 BOPH natural. Six hours after treatment was flowing 13 BOPH. Declined to 9 BOPH before potential.
B	Driver Glasscock	1,500 Jel X 1,000 Sand 2,600 psi. 2.4 B/M	(Pot. 795+ BOPD) Rotary completion, 35 ft. off perf. pipe. Swabbed dry before treatment.
C	Tex-Harvey Midland	1,500 Jel X 1,000 Sand 2,450 psi. 2.2 B/M	(Pot. 661+ BOPD) 69 ft. of cable-tool open hole. 2 BOPH casing swabbed before treatment. After treatment kicked off with 6 pulls of the swab. Flow plus or minus 28 BOPH on ½-in. choke with 250 psi. back pressure.
D	Benedum-Spraberry Upton (Lower Spraberry)	3,000 Jel X 3,000 Sand 2,600 psi. 3.6 B/M	(Pot. 234+ BOPD) No natural test. 111 ft. of hole drilled with rotary and oil. Pay called from 7,520-60 Lower Spraberry.
E	Weiner-Floyd Glasscock	3,000 Jel X 3,000 Sand 2,800 psi. 5 B/M	(Pot. 240 BOPD) Swabbed and flowed 227 bbl. first 17 hours then flowed 10 BOPH through ½-in. choke with 80 psi. back pressure.
F	Tex-Harvey (Northeast) Midland	1,500 Jel X 1,000 Sand 2,300 psi. 2.5 B/M	(Pot. 289 BOPD) Cable tool hole. 105 ft. drilled 50 ft. into pay. Flowed 12 hours after treatment for an average of 12 BOPH.
G	Driver (Central) Glasscock	1,500 Jel X 1,000 Sand 2,000 psi. 3.5 B/M	(Pot. 396 BOPD) Cable-tool hole. 50 ft. of free oil. Kicked off by swabbing after treatment averaged 18 BOPH flowing on a 5-hour test.
H	Driver (Central, East) Glasscock	1,500 Jel X 1,000 Sand 800 psi. 3 B/M	(Pot. 816 BOPD) 95 ft. of cable-tool hole swabbed dry before treatment.

Sample 3 was identified as barium sulfate ($BaSO_4$).

Since the Spraberry matrix has such low permeability it probably would not produce were it not for the fracture system. Conversely, well-stimulation fluids, whether they are acid, gel, or liquid hydrocarbons, will probably have no great effect in increasing the permeability of the matrix for the reason that they will be injected into and will follow the natural fractures. Or, they will open new fractures along incipient fracture planes.

With these data as a basis of thinking the problem of well stimulation was approached with a goal of reaching at least three objectives. These are:

1. The dissolving or eroding of the material within the natural fractures and adhering to the walls of the fractures.

2. The creation of new fractures along intrinsic or incipient fracture planes.

3. Leaving the natural fractures and the newly created ones permanently opened and free to the passage of oil from the matrix into the well bore.

All of these objectives seemed possible with agents previously tested in the laboratory and in numerous field applications. However, it was felt that a saving of off-production time and completion cost could be achieved if a combination well-stimulation fluid could be used in one operation to accomplish all of them at the same time. "Jel X-500" is such a well-stimulation fluid. Operators in the field have applied the name "Strata-frac" to the service employing this material. Basically, it is an acid-kerosine jel of such flexibility that additive solids and/or chemical agents may be altered in amounts to suit the problems presented by wells in any formation.

The first objective, that is, dissolving any acid-soluble material in the fractures or on the walls of the fractures is accomplished by the acids in the fluid. The second objective, creation of new fractures, is more easily attained due to the viscosity of the fluid. The third objective, leaving the fractures open, is accomplished by the addition of sand to the fluid.

Principal properties of Jel X-500 are

1. It is a smooth, uniform material when pumped into the well.

2. It will thin back to a nonviscous solution without injection of gel-breaking solutions.

3. Its ability to carry sand in suspension. (The sand used is round grained, nonbridging, of size 20 to 40 mesh).

4. Its solvent action on calcareous material, silicates, mud, cement, and petroleum residues.

Under normal operating circumstances the basic Strata-frac fluid is premixed at the loading station so that a uniform material is secured. This material is transported to the well where the required amount of sand is added and thoroughly mixed into the fluid just before it is pumped into the well.

Strata-frac treatments are performed similarly to acidizing beneath a packer. The well is filled with oil and the packer set. All treatments performed to date have used a hook-wall-type packer. The well may or may not be first broken down with oil. In either case, the new gel is pumped down the tubing and displaced into the formation at a rate believed to be best for the particular well being treated. If necessary, additional oil is pumped into the annular space to keep the forces acting across the packer equalized. Displacement is with oil.

Large gallonage displacement above that required to introduce the material into the formation has not been used. Approximately 25 bbl. overdisplacement has been the average in all wells treated with this material. There are two reasons for this overdisplacement. One is to leave the sand which has been injected into the fractures far enough out from the well bore so a minimum will fall back when the direction of fluid flow changes. The other is to remove all the sand which might have adhered to the tubing joints.

It is obvious that down-hole and surface equipment should be of sufficient strength to withstand the pressure which may be encountered. To date, the maximum surface pressure encountered in the treatment of a Spraberry well was 2,800 psi. However, the best results following treatment were reported from a well where the maximum surface pressure was only 800 psi. at an injection rate of 3 bbl. per minute.

In a well where a bottom-hole-pressure bomb was used, the following pressures at critical moments were found:

Remarks—	Pressures — Surface	Bottom hole
Well full of oil	0	2,520
Break formation with oil	900	3,330
Broke back to	700	2,620
Pumping oil at 1.5 bbl. per minute	600	3,060
Pumping oil at 2.5 bbl. per minute	900	3,140
Jel X starting into formation	1,100	3,125
Max. pressure, rate 3.5 bbl. per minute	2,100	3,260
At end of oil flush	1,300	3,110

The information gained from these data is that bottom-hole pressure required to inject the Jel X does not differ materially from that required to inject oil. There is only a differential of 120 psi. between oil injection at a rate of 2.5 bbl. per minute and Jel X

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HUDSON AIR-COOLED EXCHANGERS

Pictured above is an installation of HUDSON Air-Cooled JACKET WATER COOLERS providing cool water to the power cylinders, compressor cylinders, and lubricating oil coolers of ten 800 horsepower gas engine driven compressors. The coolers, operating with inlet air temperatures ranging seasonally from below zero to 105°F, deliver cool jacket water at a *uniform, controlled* temperature the year around.

For this installation the great expense of obtaining and treating raw water determined the selection of HUDSON Air-Cooled units—rather than HUDSON water cooling tower with HUDSON water-cooled units. The use of air-cooled units in this compressor station precluded the loss through evaporation of about 90 gallons per minute of raw water.

HUDSON Air-Cooled units are in use in a great variety of process cooling and condensing services in chemical plants, refineries, and gas processing plants.

OTHER HUDSON "TP" COOLING EQUIPMENT

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at a rate of 3.5 bbl. per minute. Also, friction loss in the tubing due to pumping the viscous material is only about 1,200 psi. more than when pumping oil.

When the treatment is completed the well can be opened immediately. If it will not flow swabbing should be started at once to remove the thinned-back fluid and reaction products.

Summarized data covering the treatment of eight wells in the Greater Spraberry field using Jel X-500 are shown in Table 1. It will be noted that from 1,500 to 4,000 gal. of the stimulating fluid has been used. All of these treatments were successful in increasing the amount of production, the potentials following treatment ranging from 215 to 816 bbl. of oil per day. This difference in potential is not due to the amounts of material used or to the technique of treatment but is due to their areal location within the Greater Spraberry field. With the exception of one well, which was in the Benedum, all of these wells are completed in the upper Spraberry. This exception is reported to be completed in the third or lower zone.

Questions have been asked as to whether such well-stimulation treatments will be necessary at regular intervals during the productive life of the well and will such re-treatments be effective.

There is no great amount of data available upon which to base an opinion. However, in some wells which have been treated by a similar service it has been found that the bore has become bridged with sediment, sand, and other material produced with the oil or falling from the walls. It would appear there is a probability the fractures treated in the primary stimulation job may become plugged with sediments which will tend to reduce the flow. If this occurs, a re-treatment might prove effective and economical if such treatments do not require too much work-over rig time in clean out and preliminary conditioning for the re-treatment.

Some Spraberry wells have been shot with nitroglycerin to stimulate production. In some instances when production declined these wells have been treated with gels and production has increased to that originally secured.

The low bottom-hole pressure of the reservoir may tend to cause greater deposition of sediment in the flow channels. Hence, it would appear a re-treatment to clear this sediment might prove effective. At this time, and until more production data and well information are available, it is not possible to project a re-treatment technique either as to the amounts or types of stimulation materials. Research, field application, and experience with Spraberry well production following treatment will be necessary before reasonable recommendations can be made.

It seems that one approach to a better technique of well stimulation for either the primary treatment or re-treatment could be based upon the definite determination of the section where the oil is entering the well bore. This would be valuable in deciding where in the vertical section to apply the treatment. This would be particularly advantageous where 1,000 ft. of hole has been drilled with several hundred feet of known oil-bearing rock within that total section. For a secondary or re-treatment it might be deemed best to apply at least a part of the stimulating fluid to a section known to have oil within it, but shown not to be producing in the survey made. A method to survey these wells to determine their producing sections seems not to be insurmountable and may be available at an early date.

Relation of Fractures to the Accumulation of Oil

by George R. Gibson

Gibson, Leeper & Cole, geological consultants, Midland, Tex.

Many data have been accumulated regarding the distribution and structure of the Spraberry formation. An immense amount of reservoir data has been gathering in the form of cores and core analyses, sample cuttings, electric and radioactive logs; but because of the rapidity of drilling on the Spraberry trend and the pressure of other work, the geologists and engineers in the booming Midland basin have had little time to stop and interpret and analyze this mass of informative data. This article summarizes some of the reservoir data and places a few interpretations on the more obvious phenomena.

TO start with, it should be pointed out that the Spraberry formation is composed of shales, siltstones, limestones, and sandstones in that order of abundance. Sandstone in the so-called Spraberry trend, is a minor constituent in the Spraberry formation. What is commony referred to as sandstone is, in reality, a siltstone. This siltstone is composed of very fine particles of quartz about 1/45 mm. in size, angular in shape, and very tightly cemented.

The lower size limit of sandstone is $\frac{1}{16}$ mm. The siltstone has very few of the physical properties of sandstone, except possibly chemical composition, but is more closely related in its physical properties to a dense, massive shale, or to a cherty limestone. Therefore, a geologist or engineer who searches a Schlumberger or radioactive log with the intent in mind of interpreting the sand "kicks" may be starting out with a false premise.

Considerable study of sand cuttings by a few geologists, using the binocular microscope, has been made on the Spraberry formation; however, not nearly as much study as should be done. We have found an easy tool in the electric log and the radioactive log, and have neglected detailed examination of cuttings, but this leaves us without an interpreter when studying these electric and radioactive logs.

Lithology

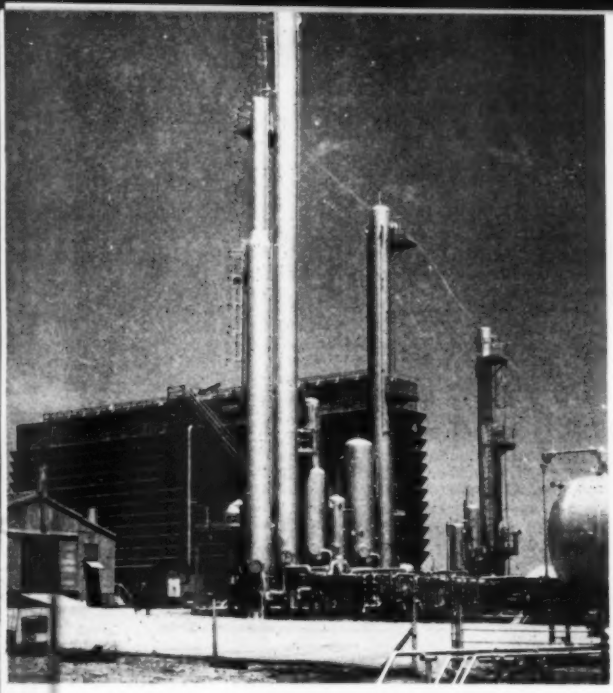
For the purpose of a more detailed description of the lithology, a number of thin sections were made of the various component rock types of the Spraberry formation, and a petrographic was made. According to this cursory examination of a number of thin sections—not nearly enough but at least a beginning—the Spraberry is made up principally of a massive silty shale, a bedded black shale, a laminated siltstone, and a massive siltstone.

Massive silty shale.—In the hand a specimen of this shale is gray to black in color with bedding obscure to absent. When broken, the shale does not part along bedding planes, but parts at any angle. Vertical or near-vertical fractures are present.

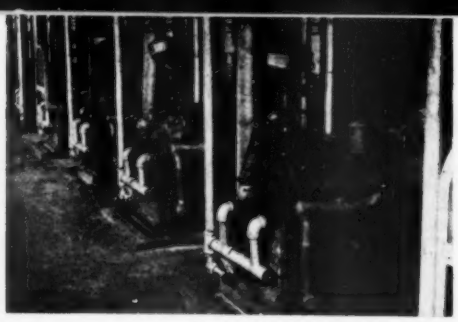
Under the petrographic microscope, this massive shale is composed of 65 to 78 per cent clay minerals, 15 to 20 per cent carbonate grains, 5 to 10 per cent quartz grains, and 2 to 5 per cent arkose grains. The clay minerals are too fine to be identified except for about 1 per cent of muscovite or sericite flakes. The carbonate is probably all dolomite, as a few rhombs are identifiable. The quartz grains are angular and sharp. The arkose grains are remarkably unweathered and appear to be of the acidic type. The size of the carbonate and quartz and arkose grains is about 1/30 mm., thus in the silt-size class. The carbonate, quartz, and arkose grains are disseminated throughout the ground mass of shale minerals with no contact between the individual grains.

Black bedded shale.—This shale is

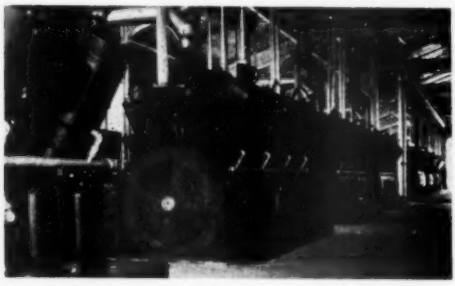
(Continued on page 116)



Processing section of the new gasoline plant operated by Standard Oil Co. of Texas in North Snyder area.



Battery of automotive internal combustion engines for powering cooling water centrifugal circulating pumps. Engines are fueled with plant residue gas.



The plant's compression equipment consists of 13 units. Wet-gas capacity is 20 million cubic feet daily.

Scurry County Plant Built in 4½ Months

New gasoline plant features use of high-speed internal-combustion engines to drive centrifugal-type cooling-water circulating pumps. Products total 114,185 gal. daily

by Roy F. Carlson
West Texas District Editor

A VERY short period of construction—less than 5 months' time—with a minimum investment in new equipment highlights the gasoline plant of Standard Oil Co. of Texas in North Snyder field, Scurry County, West Texas, as unusual.

The plant, of 20,000,000 cu. ft. daily capacity, is built partly of new and partly of old machinery. Old equipment, primarily gas-engine-driven gas compressors, was moved from Standard's South Ward gasoline plant which was closed down and dismantled a little more than a year ago. The South Ward plant was in operation from October 1936 to April 1950.

The first compressor block was poured for the Snyder plant on May 6, 1950. The plant first began making product on October 20 of the same year.

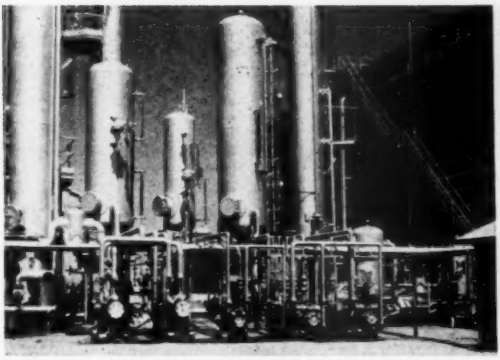
Old equipment moved from the Ward plant included seven V-angle compressor units, a portable-boiler-type steam plant, jacket and spray-water pumps, and some gasoline-storage tanks. Towers and propane and butane storage are new as are some of the gasoline storage and the cooling tower.

Equipment is presently designed for a wet-gas capacity of 20,000,000 cu. ft. per day, with distillation and rectification units handling products from that gas. The gas contains about 9.4 gal. of propanes and heavier components per 1,000 cu. ft. About 5 gal. of product per 1,000 cu. ft. of wet gas is extracted in the plant process, the plant being designed to recover 35 per cent of the propanes, with excess capacity for larger recovery if deemed necessary later in the plant's life. The absorber is designed toward this end, having a capacity for a high absorption-oil circulation rate.

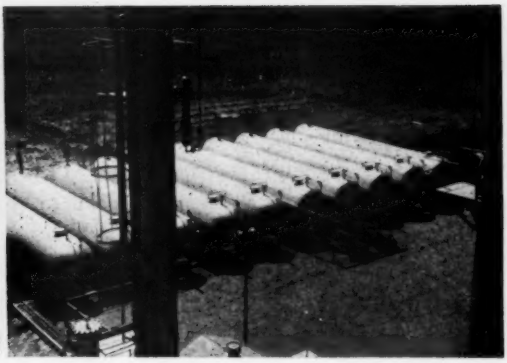
Circulating Water

One of the most unusual of the mechanical features of the plant is its use of high-speed automotive-type internal-combustion engines to drive centrifugal-type cooling-water circulating pumps. These engines are run at about 1,400 r.p.m. and deliver about 15 b.hp. at the pump coupling. Engines are adapted to use plant residue gas as fuel. Some of the engines are equipped with generators for battery ignition and others use magnetos.

Excess equipment has been removed from the engines. For instance, fans have been taken off the engines since all cooling is done in a central system, circulating cooling water from the cooling tower. Operation of these engines has been satisfactory. Replacement engines are kept in readiness at all times for rapid installation when one of those in use fails. Repair and overhaul of the engines



Steam-powered reciprocating units pump absorption oil and liquid product in the new plant at North Snyder.



Battery of new propane-butane storage tanks. A portion of the gasoline storage was moved from another plant.

are done in plant shops. Repair is kept down by keeping engine speeds and loads to a relatively low figure.

Other pumps in the plant, handling products and absorption oil, are reciprocating, being direct driven by reciprocating steam pumps. The steam is furnished by the aforementioned portable-boiler steam plant. Exhaust steam from pumps heats reboilers, and condensed steam is all returned to the boiler plant.

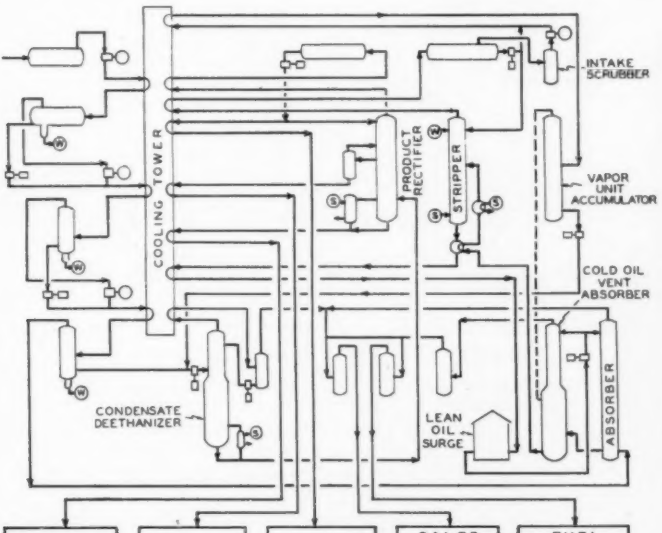
The wet gas is compressed in three stages, with inter and aftercooling, to a pressure of 500 psi. Liquid product and water formed after intercooling are collected and pumped around the next compression stage. The first stage of compression takes gas from 5 to about 50 psig. and uses on the order of 1,500 hp.

Second-stage compression increases pressure from 50 to about 200 psig., using about 1,500 hp., and the third stage takes gas to its final pressure of 500 psig. with about 1,000 hp. of compression. Thirteen V-angle, direct-connected four-stroke-cycle compressors are installed in the compressor house to perform this compression.

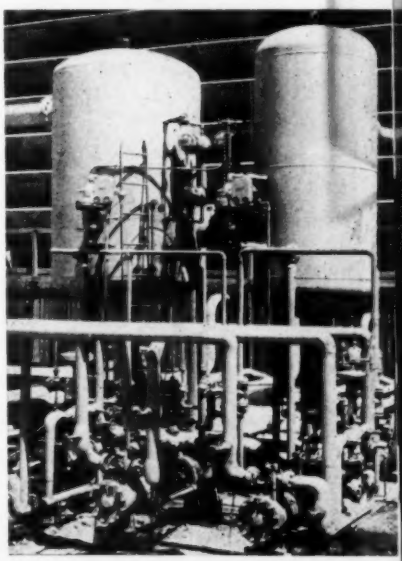
Liquids condensed by the various inter and aftercooling units are sent to the deethanizer tower at 500 psig. and liquids from the deethanizer are sent to the product rectification tower for splitting into the desired products. Normal operation produces 25,006 gal. of propane product per day, 35,704 gal. of 90-lb. v.p. L.P.G. product, and 53,457 gal. of 26-lb. R.v.p. natural gasoline.

In the interest of national defense, additional rectification equipment is being added to further split the 90-lb. v.p. L.P.G. and make a 95 per cent isobutane product an essential part of alkylation feed stock.

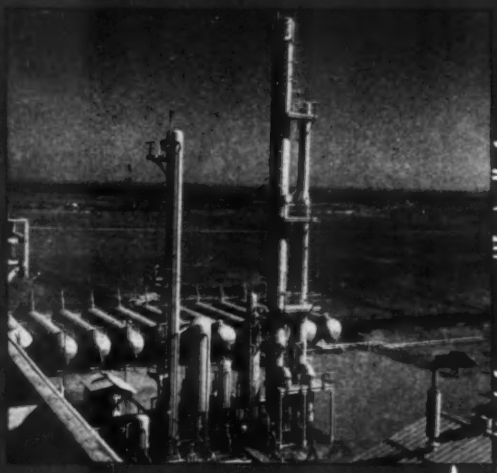
Gas from the top of the high-pressure accumulator goes to a 30-tray absorber. Rich oil passes through a 100-psig. cold oil vent absorber and is stripped in a 24-tray stripping tower. Stripped product then is sent to the deethanizer and rectification towers. Absorption takes place at 460 psig. and stripping takes place at 35 psig. with 295° F., 50-psig. steam.



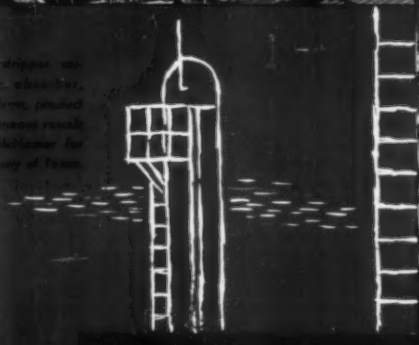
Flow arrangement of the new natural-gasoline plant operated by Standard Oil Co. of Texas in Scurry County.

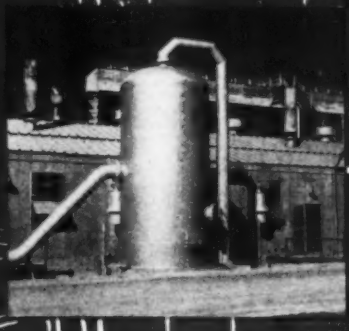


Interstage separation equipment for water removal.



Just a sample of McNamar's dependability





This Standard Oil Company of Texas Gasoline Plant Project in North Snyder field, Scurry County, West Texas, is proof of McNamar's dependability and speed in quality refinery vessel fabrication. The job was done in record time to meet the short construction period requirements. Yes, when you need dependable fabrication service McNamar comes through.

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CORROSION and its control

Corrosion Rates by Direct Observation

WHENEVER a plant or a piece of equipment in which there is the slightest probability of corrosion is shut down for any reason, the opportunity should be taken to make an inspection for damage by corrosion. Much of the value of such an inspection will be lost, however, unless measurements are taken in quantitative terms, and the values carefully recorded. Too often the inspection merely seeks the answer to the question of whether or not the facility needs repairing, reconditioning, or replacing; damage too slight to call for immediate remedial measures may not even be recorded.

The first item to be recorded is a description of the general nature and appearance of the corrosion. It is desirable that terms be employed in the description which are well-defined, so that observations by different inspectors will be comparable. The following terms will be found useful in describing the degree of attack at a given location; the distribution should also be described:

1. No corrosion. This term should be used when the surface of the metal appears to be entirely unaffected.

2. Definite surface corrosion. The surface may be described as "dulled," "matte," or "roughened"; if the attack extends to a depth sufficient to catch a knife blade, however, the next degree should be specified.

3. Shallow metal attack. This denotes the apparent removal of a perceptible, although hardly measurable, amount of metal from the surface.

4. Pitted or grooved. Metal removed to a measurable depth. The size, depth, shape, and distribution of the pits and grooves should be described. If the attack takes the form of grooving, it is particularly important to note the direction in which they run; if pitting, any tendency to cluster or to line up in any detectable configuration should be observed. Data such as this are important not only because pattern grouping of pits weakens a structure more than random scattering, but also because this grouping may furnish a valuable clue as to the true nature of the corrosion.

5. Blistering or scaling. Sloughing off of thin layers from the surface of the metal may be indicative of a very important type of corrosion caused by hydrogen diffusion (often, but not always, associated with high temperatures or pressures). Blisters often indicate an earlier stage of the same or a similar type. Size and number should be indicated, as well as distribution.

6. Cracking, checking, or crazing. Apparent size and number should be indicated. It is particularly important to observe any tendency for cracks or fissures to follow a regular pattern. It should be noted that the occasion to record damage of this type will not often arise, since any structure in this condition will probably not be put back into service.

For the recording of any of the visible forms corrosive attack, photography is quite useful. The comparison of pictures taken at previous inspections will frequently make possible an accurate envisioning of the progress of corrosion, even when it is difficult or impossible to reduce the observations to quantitative terms. Another device which may be found useful in recording the larger effects of pitting and grooving is the making of plaster casts. Sometimes this will preserve for later measurement or study effects for the full study of which time is not available, or which are located in places difficult of access.

All of the above mentioned devices are efforts to obtain quantitative data from essentially qualitative effects. It goes without saying that any corrosive effects which lend themselves to direct measurement should be so recorded. Pitting is particularly adapted to measurement. The use of a micrometer pit gage is recommended, and the location of each measured pit should be carefully specified. From the time of exposure and the depth of the pits it is not usually possible to obtain a simple relationship which can be interpreted as a penetration rate, because corrosion of this type is rarely constant in rate. However, if the inspection times are sufficiently short, it may be possible to obtain several measurements of depth on a single pit before it is necessary to repair it; a time-depth curve will then be plottable, and may be extremely valuable in predicting the effective service life of a piece of equipment.

In the interpretation of such a curve, care should be exercised to take into consideration any changes in operating conditions which may have occurred, since even small changes can be of major influence. It is also necessary to consider the distribution of pitting, so that proper interpretation may be placed upon the values obtained. One of the best ways to accomplish this needed differentiation is the separate plotting of the deepest pit in each of a set of rigidly defined areas; the selection and definition of the areas to be used must be determined by the nature of the equipment under study. Or the average depth of the three deepest pits in each area may be chosen; whatever choice is made, it should be accurately described and then rigidly followed in future inspections.

Part 37 of a series by Marshall E. Parker, consulting engineer, Houston.

QUESTIONS on TECHNOLOGY

by W. L. Nelson
Consulting Engineer

Inferior Absorption Oils

The absorber on our cracking plant doesn't absorb right. What could be causing the capacity to be far below the expected performance?—S. M. C.

More complete information is required to answer the question. However, it is possible that the absorption oil contains certain hydrocarbons or agents that promote foaming. In general, cracked or highly unsaturated petroleum fractions tend to foam, and if waxy or tarry components are present the tendency becomes very pronounced. It is also suspected that small quantities of organic acids impart a tendency to foam. Such unsatisfactory or inferior absorption oils were first brought to attention by Dr. H. C. Schutt in 1945 (Petroleum Refiner, page 93, July 1945).

When the oil foams it fails to flow through the downcomer at the design rate and thus creates such a high (liquid level) pressure on the plate that the liquid backs up to the tray above, creating progressively a flooding condition throughout the entire tower.

Of course, absorption oils should have low molecular weights but high-boiling points (i.e., low vapor pressures). However, little can be done about this relationship, and absorption can be affected by this relationship in only a minor way.

Once-Through Yields by Catalytic Cracking

It seems that the yield of B-B cut shown in Petroleum Refinery Engineering for catalytic cracking and much the same shown in The Oil and Gas Journal of August 30, 1947, is too low. Have you any more up-to-date information? S.M.T.

Catalytic cracking is probably too complicated to allow the development of accurate yields based on only conversion per pass. Temperature most certainly affects the yields and the character of the products. Likewise, the properties of the charge stock (characterization factor and boiling range) affect the yields. Thus, a comparison of new data with the yields shown in The Oil and Gas Journal or those shown in Petroleum Refinery Engineering, cannot be made without neglecting the important effects of temperature, charge stocks, and even other factors. This means that all such comparisons are only gross approximations.

Two excellent studies have been presented:

1. Ardern, Dart, and Lassiat, p. 13 of "Progress in Petroleum Technology," Jubilee Meeting of the A.C.S., New York, September 1951.

2. Olsen and Sterba, Chem. Eng. Progress, Vol. 45, p. 692 (1949).

These two papers should be consulted for a complete discussion of the yields obtained in catalytic cracking.

The information given in the two paper can scarcely be compared with the PRE yield equations, but an attempt has been made, as shown in Figs. 1 and 2, to obtain an approximate relationship. It will be seen that the yield equations of PRE give low yields of coke, low yields of B-B cut, high yields of gas, and perhaps slightly high yields of gasoline. In analyzing the Ardern data, it was necessary to confine the study to a feed stock having a characterization factor of 11.6 (mixed base) and an operating temperature of 890° F. or a little lower. Likewise, the analysis of the Olsen data had to be confined to average stocks and operating conditions. It might be stated that PRE data were assembled long before any adequate yield data had been published. This is particularly true of the information available about gas and B-B yields. Accordingly, it was necessary at that time to somehow split or segregate the combined yield of gas and B-B cut, and it was decided to make the two yields equal to each other. It is now obvious that the yield of B-B cut is larger than the yield of dry gas.

The yields (weight percentage) of Figs. 1 and 2 can also be shown as equations:

Dry gas —	PRE	0.18C—1.5
	Olsen	0.17C—3.0
	Ardern	0.23C—5.5
B-B cut —	PRE	0.18C—1.5
	Olsen	0.21C—0.5
	Ardern	0.28C—5.5
Gasoline —	PRE	0.46C + 9.0
	Olsen	0.46C + 7.0
	Ardern	0.46C + 9.0
Coke —	PRE	0.18C—6.0
	Olsen	0.13C—2.5
	Ardern	0.16C—4.0

In these equations, the symbol "C" designates percentage conversion.

A more significant comparison is the amount of gasoline and B-B cut combined. Thus, at 40 and 60 per cent conversions the combined yields of B-B cut and gasoline are:

	40 per cent conversion	60 per cent conversion
PRE, per cent	33.1	45.9
Olsen, per cent	33.3	46.7
Ardern, per cent	33.1	47.9

It must again be emphasized that the yields shown here simply as a function of conversion per pass are only approximate and that the comparisons could not be made at all except by neglecting much of the detailed information given in the two excellent articles.

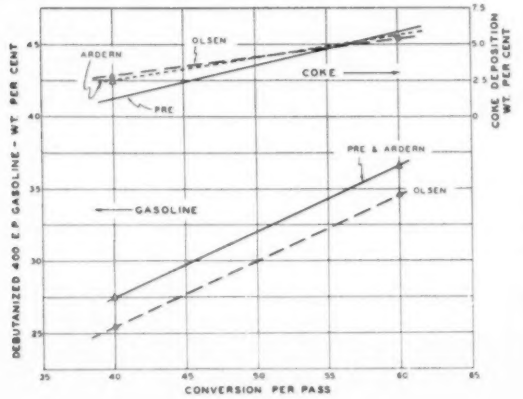
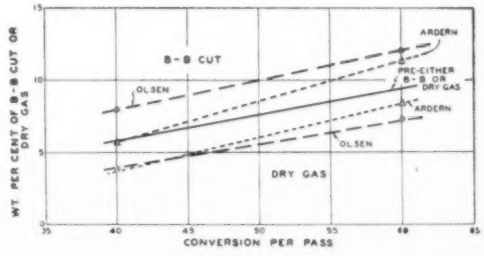


Fig. 1—(Left) Approximate once-through yields by catalytic cracking based only on conversion per pass.

Fig. 2—(Below) Approximate once-through yields of dry gas and B-B cut by catalytic cracking, based only on conversion per pass.



CROOKED HOLES

Deviation clause in contracts is cause of concern to contractors

by Bruno Scharbarum*

While crooked holes have been with the drilling industry for many years, the author says they were not much of a problem in the Permian basin of West Texas prior to 1945. He says additional weights are being obtained by running drill collars and that even though they are stiffer than the pipe, the formation still provides sufficient reaction to cause the hole to deviate in some cases.

THE term "crooked holes" is a rather loose definition of the problem under discussion.. In the drilling industry a hole is crooked if the slope of the hole is away from the vertical by 3°, 4°, or 5° depending upon the limits set by the operating company.

Historically, crooked holes have been with the drilling industry for many years. In the Seminole, Okla., boom, several stories are told of one contractor running into a hole being drilled by another. During those times one or two drill collars were used, but bit weight was secured by running the 6⅝-in. drill pipe in compression. It is conceivable that this contributed materially to the crooked-hole problem. In those days instruments to measure the angle of inclination of the hole were not used.

Bit weights.—In regard to the Permian basin of West Texas, crooked holes were not much of a problem prior to 1945. In those days the drilling weights on 8¾-in. bits were about 15,000 lb., and about 12,000 lb. on 6¾-in. bits. When it was learned that much faster rates of penetration could be obtained by increasing bit weights, the problem of the hole working away from the vertical became more important.

Today, most contractors are running from 40,000 to 60,000 lb. on 8¾-in. bits and from 20,000 to 40,000 lb. on 6¾-in. bits. These additional bit weights are being obtained by running drill collars, and even though the collars are stiffer than the pipe, the formation still exerts a sufficient reaction to cause the hole to deviate in some cases.

Another factor that has aggravated the problem is that as the wells become deeper, formations below the massive Permian limes and dolomites are penetrated. Some of these formations are shales, others are layers of limestones and sands and cherts. It is well recognized that changes of formation are conducive to making the bore hole travel away from the vertical.

As the walls become deeper, the rock also assumes greater physical strength and it is well known that the drillability of the rock decreases as the strength increases. It therefore requires greater bit weight to penetrate these extremely hard rocks. Any fracture or voids which may be at an angle will decrease the reaction in that direction and accordingly, the hole will deviate in the same direction.

Speed of rotation.—This also seems to have some influence on crooked holes. As bit weights have increased, it has been found advisable to decrease rotating speeds so as to secure satisfactory bearing life of the bearings in the cones. Slower bit speeds seem to be conducive to hole deviation.

Drilling fluid.—It may be said that any factors which decrease drilling rates such as high viscosity or low water loss of the drilling fluid are condusive to crooked holes. This statement is made because we cannot recall one instance where a crooked hole was experienced while drilling with water.

Large-diameter drill collars.—It is obvious that it is easier and less hazardous to keep a hole straight than to straighten one after it has gone crooked. The best means of doing this is to use drill collars of as large a diameter as the hole and fortitude of the operator will permit. Arthur Lubinski, of Stanolind Oil & Gas Co. research department, has recently pointed out the above by theoretical treatment of the problem. He shows that a 6¼-in.-diameter drill-collar string will buckle when the bit weight exceeds 8,500 lb., while an 8-in.-diameter drill-collar string will require 16,300 lb. before it buckles. These figures apply when using both strings in 9-in. holes. In 8¾-in. hole, this condition should be some better.

About 3 years ago, our company began to use larger collars in holes which tended to go off the vertical. Today we use 8-in. collars in 8¾-in. hole; 7-in. collars in 7⅞-in. holes, and 6¼-in. collars in 6¾-in. holes. Generally, only five or six large collars are used at the bottom of the string and the rest are reduced in diameter. While this practice seems to help, it is not a definite cure-all for the problem.

Bladed stabilizer.—Our company has also resorted to using this equipment above the bit. The tool is 10 ft. long and the blades are wide with a diameter across blades of 8⅝-in. for the tool to be used in 8¾-in. hole. The 7⅞-in. hole tool is 7¾-in. o.d. and the 6¾-in. hole tool is 6⅝-in. o.d. This stabilizer is run immediately above the bit. Some thought has been given to running two stabilizers, one immediately above the bit and the other on top of the lowest collar. This scheme may have merit as the guided section will be considerably longer than at present. Keeping the rotary speed up to at least 80 r.p.m. will also help to keep the hole closer to vertical.

Deviation Limits

After a hole has gone to the limit of deviation allowed, then the problem of straightening is present. The first thought is to hold up the weight and spin the rotary up to 110 to 120 r.p.m. It is natural to assume that this practice will straighten the hole because this is the way we used to normally drill a few years ago. But it is also true that the rate of penetration falls way off and if the bit does not make hole, then the deviation cannot be decreased.

Setting an oriented whipstock at the bottom of the hole and kicking the hole back also has its possibilities. Sometimes, however, the whipstock turns and the hole is in much worse shape than it was originally.

All of the above have various modifications.

We have observed numerous cases where the deviation has exceeded the figure set by the contract but the contractor was allowed to continue to drill for the reason that it was felt that there was no practical way of producing a hole whose deviation was less than that required by the contract. Further, there is considerable question that a simple deviation test

*General manager, Carl B. King Drilling Co., Midland, Tex. Paper presented at eleventh annual meeting A. A. O. D. C., Fort Worth, September 1951.

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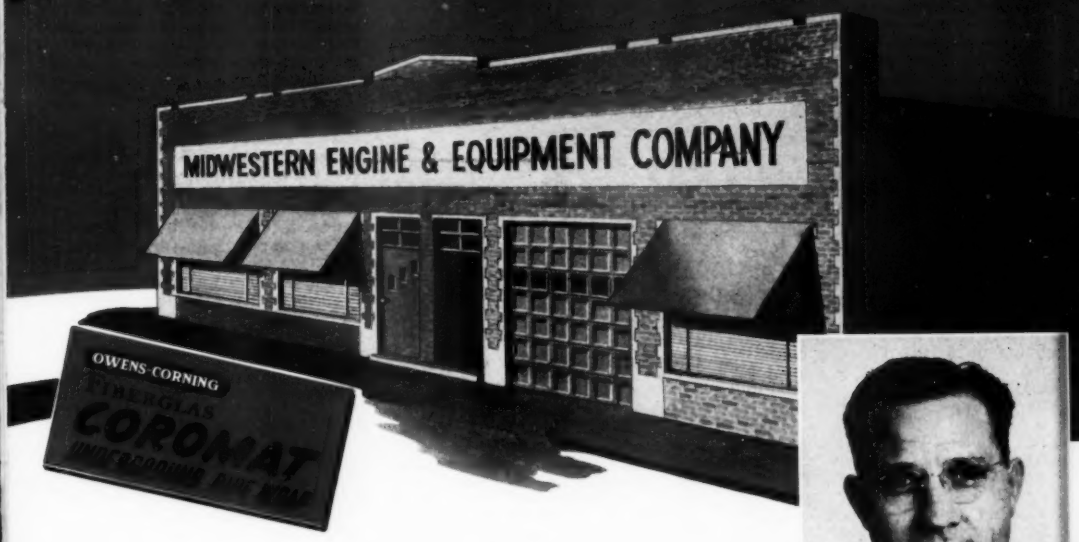

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means very much from the angle of practical production practice.

In thinking of the deviation clause in a contract it is thought of as a means of limiting the horizontal drift of the bottom of the hole with respect to the top of the hole. This association is incorrect for the reason that most of the instruments in common use only measure the angle to the vertical of the tangent to that section of the hole which is being measured. It can be easily seen that a high angle of deviation may still permit the hole to bottom very close to a point directly below where the hole was started.

Another reason that has been given for specifying low-deviation angles in the contract is fear of running casing and later production problems. We are all familiar with practices followed at Long Beach, Huntington Beach, and other coastal fields in California. Some of these wells deviated as much as 30° and 40°. No particular casing or production problems are encountered.

There is not much question but that living up to the deviation clause in the drilling contracts is one of the most serious difficulties that confront the drilling contractor. It is time that a concerted effort be made to solve this problem. The Mid-Continent District A.P.I. has a study committee working on the problem. Their approach seems to be to try and devise ways of drilling straight holes. So far, they have advocated the use of larger and larger drill collars. We have complied with this practice for several years and know that it is not an absolute solution.

We would like to propose the formation of a committee sponsored by the contractors association and which would have as members both contractors and operating-company personnel. Their first obligation would be to determine exactly the reasons for including the deviation clause in the contract, and to determine the end result desired.

After the above has been determined, then means of accomplishing this result could be devised.

We think that this procedure is highly desirable because it is felt that the deviation clause in a contract is indefinite and does not necessarily secure the results required; further, in attempting to comply with the clause, great expense is forced upon the industry. To substantiate and indicate the thinking of some of the producing companies, we would like to report that one large operating company has removed the deviation angle entirely from its contract. Their contractors still run straight-hole surveys and efforts are still being made to keep the holes reasonably straight.

Three large operating companies in the Permian basin, while they have not removed the straight-hole clause, advise that they have liberalized it because they realize that it is practically impossible so stay within the limits commonly accepted in the past in certain areas. One of these companies requests that the rate of change of deviation be confined to 1° or less per 100 ft. of hole if possible.

Another operating company has made it a practice to run a direction survey of the hole whenever it seems crooked. If the survey indicates that the bottom of the hole is in a cone of a given size whose vertical axis passes through the center of the location and if the rate of change of slope is not too great, then they permit the contractor to continue drilling even though the slope test is considerably above the upper limit specified in the contract.

It is our opinion that as we drill deeper and faster this problem will become more expensive and more significant. It is therefore earnestly suggested that some action be taken on this matter by the industry in the immediate future.

Relation of Fractures to The Accumulation of Oil

(Continued from page 107)

essentially the same in composition as the massive shale, except that on a hand specimen it will break horizontally or parallel to the bedding planes. In cores, it has a tendency to break into pieces 1-in. thick, as is characteristic of a "biscuit" shale. Fracture is prominent, and because of the presence of both bedding and fracturing, the shale is believed to be the principal cause of hole caving. Caving is not due to breakdown because of the absorption of water, but is due to lubrication of these horizontal and vertical planes of parting.

This type of shale is carbonaceous and probably deposited under shallow water or swampy conditions. Several fossil leaves have been found in a core in the Argo Oil Corp. 1 Cook, in central Glasscock County. These fossil leaves, about 3-in. long, were found at a depth of 6,810 ft. in the lower Spraberry section.

Under the petrographic microscope, this shale is composed of 90 per cent clay minerals and 10 per cent carbonate and quartz grains. Sericite, or muscovite flakes are scattered throughout with orientation parallel to the bedding planes. The carbonate is probably dolomite. The quartz grains are of silt size, about 1/50 mm. and are angular and sharp. The clay minerals, after burial, have undergone change or metamorphism resulting in a reduction in volume.

Laminated siltstone.—In the hand a specimen of this rock appears to be very thinly bedded or laminated, about ☆ in. in thickness. Breaks are parallel to these laminations, or bedding planes. Fracturing is quite common. A thin section observed under the petrographic microscope, cut at right angles to the bedding, reveals a composition of 90 per cent quartz, 5 per cent carbonate, and 5 per cent shale. One zircon crystal was noted. The quartz is interbedded with the thin discontinuous shale beds. The quartz is angular, even-sized, sharp grains. The carbonate grains, probably dolomite, are the same size as the quartz and are disseminated throughout the mass. A description of the shale minerals is essentially the same as those in the bedded shale. The shale bends around the quartz grains as if by compaction the grains were pushed into the shale.

Siltstone.—Essentially a quartzite in its physical properties, this consists of very tightly cemented, angular quartz grains of uniform size and shape. Bedding is absent and breaks are along irregular surfaces. The mineral composition is 78 per cent angular quartz grains, 10 per cent carbonate grains, probably dolomite, and 2 per cent relatively fresh feldspar. One feldspar piece appeared to have microline twinning. All constituents are the same size, about 1/40 mm. in diameter, which definitely places the rock in the siltstone-size class.

This siltstone causes the potential curve to kick to the left sharply, and the first kick is generally picked as the top of the Spraberry formation in Tex-Harvey field. A number of investigators have selected these siltstone kicks as the pay in the Spraberry formation. On the gamma ray, this siltstone causes a sharp kick to the left because of the absence of potassium. Some investigators have added up these siltstone kicks and called the sum the effective pay. Nothing could be more to the contrary as the siltstone, having less than 10 per cent porosity and less than 1 md. permeability, is probably the more barren part of the pay zone. It is true that this siltstone in cores is generally the better stained part of the pay; however, the oil may have saturated the siltstone by moving from the fractures rather than the siltstone feeding oil to the fractures.

The average porosity of the Spraberry formation, including all types but excluding fractures, is less than 10 per cent; and average permeability less than 1 md. One cannot expect a rock of this density to produce much fluid unless fractured. From an examination of numerous cores and sample cuttings, the shale, siltstone, and limestone in the Spraberry contains numerous fractures. Not only is there fracturing in the Spraberry proper, but also in the overlying shale.

Fracture System

The fractures and the fracture system in the Spraberry formation are the key to the production and the variable initial production rates obtained from the producing wells. This fracture system is, in general, near vertical, but to date little is known about the pattern. Some fractures are known to extend vertically more than 100 ft. In questioning a number of

geologists, and engineers who have examined cores, these fractures are common in the shale and laminated siltstone, but have a tendency to die out or become very tight in the massive siltstone. While cementing pipe, cement has been known to travel downward in some areas as much as 100 ft., and subsequent coring has revealed the size and volume of a number of these fractures. It should be pointed out that the injection of cement did not open these fractures, but the fractures were there and the pump pressure forced the cement into them.

In a well in the Pembroke area, Upton County, in the upper part of the Spraberry, at a depth of approximately 7,100 ft., pipe was cemented with something like 4,000 sacks. None of the cement went behind the pipe. Drilling into this pay was by reverse circulation, and cuttings of a fair size were obtained. Approximately 10 per cent of the cuttings was cement in fractures. Cracks or fractures filled with cement as wide as ¼ in. were present in this black shale. Incidentally, the shale appears to be the massive type rather than the bedded "biscuit" type. This is only one instance where sample cuttings revealed the presence of open fractures in black shale. Many other examples could be cited.

From the above core and sample data, it is definite that the reservoir of the Spraberry formation is of the fracture type. A major portion of the oil reservoir is in the black shale and the laminated siltstone. The pure siltstone has a few fractures and those present are tight, therefore this rock is not important as a reservoir. In Tex-Harvey field, an important part of the reservoir is the fractures in the black shale overlying the called top of the Spraberry. Some operators have reported shows of oil and gas in this shale as much as 200 ft. above the Spraberry top.

Since the fractures appear to be the oil reservoir in the Spraberry formation, the important question then is what is the origin of the fractures. Not sufficient crustal movement in the Permian beds has occurred to cause appreciable fracturing and the elasticity of the rocks could absorb the small amount of folding that has occurred. However, this slight movement could contribute to the amount of fracturing but certainly is not the reason for it. Any movement at a depth of 7,000 ft. would have a tendency to close openings such as joints rather than create new openings. The primary cause of open fractures at this depth is a reduction in volume of the enclosing rocks. These fractures formed after the beds were buried beneath 7,000 ft. of overburden because it is inconceivable that the fractures were present when the siltstone and shale was first formed. Therefore, this reduction in volume of the rock to form fractures took place after burial.

The reduction of volume of the Spraberry beds to form open fractures was probably due to a change in the constituent minerals which is a form of metamorphism. Because of the siliceous composition of the siltstone, the decrease was small, but due to the high water content of shales, the decrease was considerable in the shale and laminated siltstone.

Remember that the Spraberry section is composed of alternating beds of siltstone, shale, and in a few localities, dolomite and limestone and each type shrinks a different amount because of difference in mineral content. When a substance decreases in volume, it does so in three dimensions, namely: the vertical dimension is taken up by settling of the overlying beds; the two horizontal components are taken care of by vertical open fractures. If the formation were 100 per cent shale, or 100 per cent siltstone, caving and slumping would tend to close these fractures formed by shrinkage; however, when you have alternating beds of substances of different composition, the layers that shrink the least will tend to hold apart the substances that shrink the most. Consequently, as observed in cores and cuttings, the fractures in the shale are wider and more numerous than the fractures in the siltstone which, according to observation are tight or absent. The fractures in laminated siltstone should be intermediate in opening size.

Consider the shale just above the top of the Spraberry, or the first silt kick that is present on the gamma-ray curve on the radioactive log. In Tex-Harvey field, drill-stem tests have been made in the 50 ft. of shale above the first silt layer and several thousand feet of oil have been recovered. To the south of Tex-Harvey field, some operators have reported shows of oil several hundred feet above the Spraberry in this black shale. For a distance of approximately 50 ft. above the top of the Spraberry, the fractures in the shale are open, but above that distance, since no siltstone streaks are present, the fractures are closed, or tight. This probably explains why, in setting pipe in this fractured shale section immediately above the Spraberry, the cement does not go back up behind the pipe but does go into the fractures, thus sealing off the reservoir.

It is probable that throughout the Spraberry area, a portion of the reservoir is in this fractured shale just above the Spraberry formation. The rest of the reservoir is in the fractures, principally in the black shale and in the laminated siltstone. The massive, dense, siltstone is the more barren part of the reservoir because of tightness or absence of fractures.

If the explanation of the origin of the fractures is valid, the Spraberry is made up of a number of reservoirs. These reservoirs are separated by tight silt zones in which the fractures are closed or absent. There probably can be a slight migration of oil between these zones in places; however, it is not believed to be appreciable. Good evidence of separate reservoirs is present in Spraberry field of Dawson County. In the center of the field, one can drill 900 ft. and not encounter water but on edge wells water is found in the first pay streak, necessitating the setting of pipe through it. In Tex-Harvey field, on the west edge in the upper pay, water is present in the Ashland Oil & Refining Co. 1 Winkleman and in the General American Oil 1 Winkleman, 1 mile west of the field, yet production is obtained in the lower Spraberry. If the Spraberry were one reservoir, water should not be found above oil.

Another evidence of separate reservoirs is the difference in composition of the oil from the lower Spraberry and from the upper Spraberry in Tex-Harvey field. There is not only a difference in gravity of 4°, but there is a difference in the composition of the oil. Another bit of evidence is the slight variation in corrected pressures between the upper Spraberry and lower Spraberry pays.

Regarding the question of water drive in the Spraberry: Thus far, there is no indication of an effective drive. It is known that there is a water table, in fact, several in Spraberry field in Dawson County and on the west edge of Tex-Harvey field in Midland County. Thus far, there is no sign of encroachment of the water updip, so, for the present, it must be assumed that the water-oil contact is static.

In summation, the reservoir of the Spraberry formation is fractures in shale and siltstone, but predominantely in shale. The cause of open fractures is reduction in volume of the shales and siltstone. The cause of this reduction is probably a metamorphism of the shale and siltstone. The fractures have remained open in the shales, because of the presence of intercalated siltstone that are rigid and that shrank less when metamorphosed.

BOOKS

AVIATION GASOLINE AND ITS COMPONENT HYDROCARBONS — WARTIME RESEARCH (1940-45). By H. M. Smith, A. J. Kraemer, and H. M. Thorne. Published by U. S. Bureau of Mines as Bulletin 497. 79 pp. $1.50. Available from U. S. Government Printing Office, Washington, D. C.

This report is a summary of research conducted by the bureau on aviation gasoline and its components from 1940 to 1945. The work was one part of the total wartime accomplishments of the Petroleum and Natural Gas Branch on recovery of petroleum, petroleum chemistry and refining, and production of helium.

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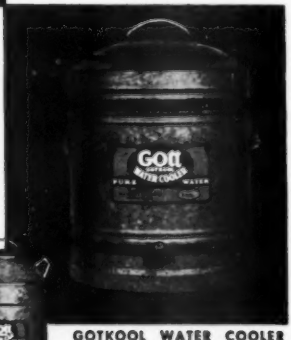

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Refinery-Gas Extraction Plants

(Continued from page 95)

particular plant is a specific problem and must be treated individually for each plant. Final choice must be made from an economic as well as an operational viewpoint. In the case shown above the estimated cost, in going from 80 per cent to 90 per cent recovery, is many times as much as the cost incurred in going from 65 per cent to 80 per cent recovery. While this additional cost may be justified for one plant, the cost for another plant may be too great for the second step and an advantageous choice would be to operate it for 80 per cent recovery.

In addition to the above considerations, other factors such as compressor horsepower costs, plant investment, corrosion problems, value of product, and availability and cost of fuel, steam and water also affect the choice of plant or type of revamp to be used. Often cost of fuel gas in the plant's area determines the optimum propane-propylene recovery figure. Capacity of the plant is still another factor to be coped with inasmuch as oversized or idle capacity is a costly item. All of the above factors as well as those governing plant's recovery must be carefully considered and studied before the economic optimum design can be determined.

The design of a modern gas plant, representing probably the latest trend in such plants, is shown in Fig. 15. This plant has been designed to recover 90 per cent of the total C_3's with negligible loss of gasoline-boiling-range hydrocarbons to fuel gas. Salient features of this design are use of a deethanizing absorber, a low-molecular-weight primary lean oil, adequate sponge-oil facilities, and elimination of all recycle-gas streams from the fractionating equipment.

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2. Hannah, J. C., Petroleum Refiner, Vol. 28, No. 8, August 1949.

BOOKS

CORDUROY ROAD—THE STORY OF GLENN H. McCARTH. By Wallace Davis. Published by the Anson Jones Press, Houston. 282 pp. $5.

This is a biography of what the author calls the King of the Wildcatters, "one of the most fabulous characters of our time." The story takes the form of a series of chronological episodes, each chapter being complete in itself. The author states he has made 400 interviews in gathering material, and also that the subject of the story hadn't seen the manuscript prior to publication. An unusual feature of this book is that rarely during the life of an individual is a book written about him by a contemporary who was at all times on the scene; written while his friends, his enemies, even his parents still live and while the landmarks still stand. A 32-page section of pictures illustrates some highlights in McCarthy's career, and an 8-page family album depicts his early life.

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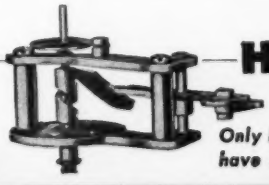

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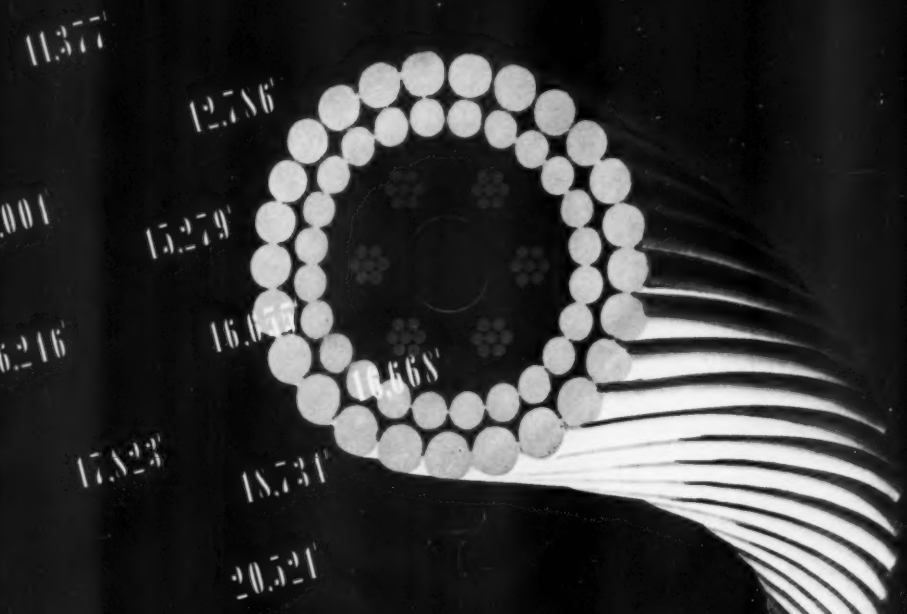

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Flood Advance in Parallel Beds

THE effect of a variation in permeability on the history of a flood depends upon the manner in which the flood progresses in a uniformly permeable bed.

One assumption, due originally to Stiles,[1] is that the advance of a flood front in a bed is directly proportional to the bed permeability. This is a special case of a more general expression for flood advance given both by Dykstra and Parsons[2] and Levine.[3]

Consider a linear system of cross-sectional area A and of length L with a flood front at position x. The movement of fluid ahead of the front is assumed to be all oil. The movement of fluid behind the front is assumed to be all water. The total pressure drop across the linear system is taken to be constant. If Darcy's law is expressed for oil flow over the distance $(L - x)$ and for water flow over the distance x, the two expressions can be combined to give the rate of flow, q, at any position of the flood front, x, in terms of a given pressure drop across the system. This equation is (see Engineering Fundamentals No. 455):

$$q = \frac{(k_o/k)\, k(P_1 - P_2)}{\mu_o L} \times \left[\frac{1}{(x/L)\,[(k_o\mu_w/k_w\mu_o) - 1] + 1}\right] \quad (1)$$

However, the total amount of water injected to give the flood front at point x is $A \times \delta \Delta S_o$, where ΔS_o is the saturation of oil replaced by water and δ is the fractional porosity. The rate of flow, q, is the derivative of this cumulative water injected with respect to time. Hence:

$$A\,\delta\,\Delta S_o \frac{dx}{dt} = \frac{(k_o/k)\, k(P_1 - P_2)}{\mu_o L} \times \left[\frac{1}{(x/L)\,[(1/\gamma) - 1] + 1}\right] \quad (2)$$

where γ is equal to $k_w\mu_o/k_o\mu_w$, and is called the mobility ratio.[2] This equation can be rearranged for integration, thus:

$$\int_0^{x_1/L} \left[\frac{x}{L}\left(\frac{1}{\gamma} - 1\right) + 1\right] d\left(\frac{x}{L}\right) = \int_0^t \frac{(k_o/k)\, k(P_1 - P_2)}{\mu_o L^2 A\,\delta\,\Delta S_o}\, dt \quad (3)$$

so that one finds for x/L as a function of time:

$$1/2\,(x/L)^2\,[(1/\gamma) - 1] + x/L = \frac{(k_o/k)\, k(P_1 - P_2)\, t}{\mu_o L^2 A\,\delta\,\Delta S_o} \quad (4)$$

Now consider that two noncommunicating linear beds, of permeabilities k_1 and k_2, are in parallel. At a given time, t, the flood fronts in these two beds will be at points x_1 and x_2. For argument k_1 is assumed greater than k_2. Equation 4 applies to either bed. The pressure drop imposed is the same for both beds. Porosities, relative permeabilities, amount of oil moved, etc., are assumed equal for the two beds. Therefore, at any given time the following equality applies:

$$1/2\,(x_2/L)^2\,[(1/\gamma) - 1] + x_2/L = k_2/k_1 \times [1/2\,(x_1/L)^2\,[(1/\gamma) - 1] + x_1/L] \quad (5)$$

It is immediately noted that for the special case where $\gamma = 1$ the equation becomes:

$$\frac{x_2}{L} = \frac{k_2}{k_1}\frac{x_1}{L} \quad (6)$$

which states that the flood-front advances in separate beds will be directly proportional to the permeabilities of the beds. Thus, the assumption of flood advance mentioned above[1] applies only when $\gamma = 1$.

The more general case where γ is not unity can be found by solving Equation 5 for x_2/L. This solution is:

$$x_2/L = \frac{1 - \sqrt{1 + 2\,[(1/\gamma) - 1]\, k_2/k_1\, [1/2\,(x_1/L)^2\,[(1/\gamma) - 1] + x_1/L]}}{1 - 1/\gamma} \quad (7)$$

In particular for the special time when the flood has just reached the distance L in bed 1, x_1/L is unity and x_2/L becomes:

$$x_2/L = \frac{1 - \sqrt{1 + (1/\gamma^2 - 1)\, k_2/k_1}}{1 - 1/\gamma} \quad (8)$$

The variations of Equation 7 are shown graphically in Figs. 1 and 2 with the special case of $\gamma = 1.0$ (Equation 6) also given. It is to be noted that for $\gamma > 1.0$ the distance traveled in bed 2 will always be less than directly proportional to permeability but for $\gamma < 1.0$ the distance traveled in bed 2 will be greater than directly proportional to permeability. The distances traveled in bed 2 as given by Equation 7 compared to that by the simpler Equation 6 are given in Fig. 3.

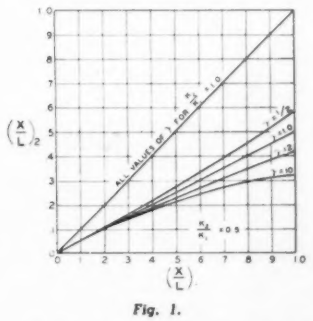

Fig. 1.

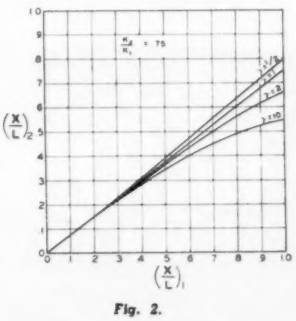

Fig. 2.

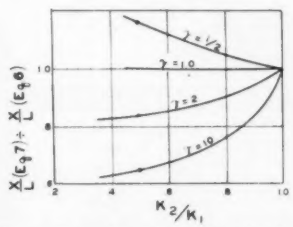

Fig. 3—Ratio of actual travel to that by assuming flood advance directly proportional to permeability.

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2. Dykstra and Parsons, Oil Recovery Prediction by Water Flood, Secondary Recovery of Oil in United States, second edition, A.P.I. 1950.

3. Levine, M.S. thesis, Pennsylvania State College, 1941.

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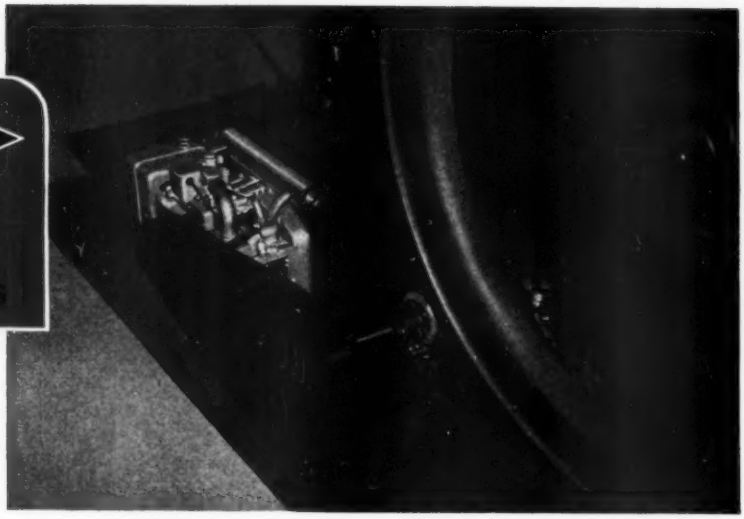

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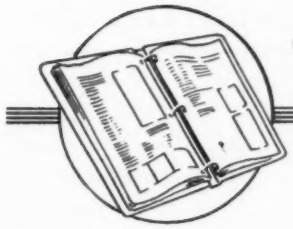


THE REFINER'S notebook

No. 99

Flow and Pressure-Instrument Connections

by H. A. Hulsberg*

FLOW-METER piping requires careful supervision, particularly where an installation includes various forms of meters, such as a mixture of mercuryless differential types, mechanical mercury types, and rotameters. The sealing systems may vary from none at all to very elaborate affairs, with consequent bewilderment of pipe fitters.

Meter piping, more than any other instrumentation, needs good installation drawings. Lack of standardization is apparent here. Different firms may use piping differing widely in complexity or simplicity. The Instrument Society of America could well spend considerable effort on recommended installation drawings for various standard forms of meters, with manufacturers' cooperation.

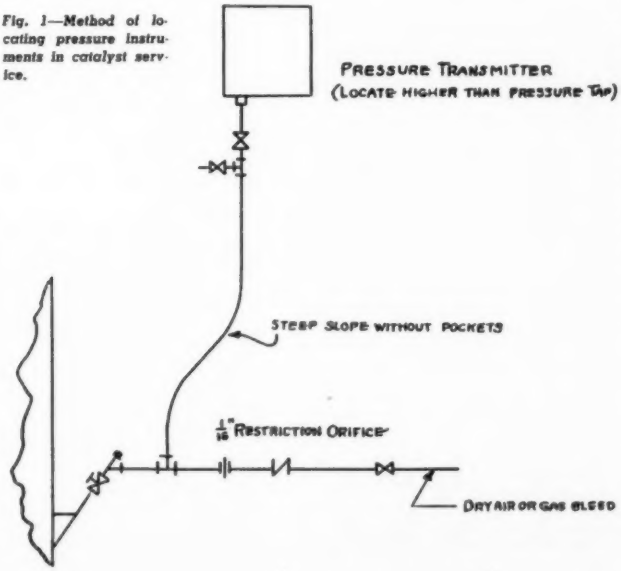
*Head of instrument engineering and service, Universal Oil Products Co. Paper presented at I.S.A. meeting, Houston, 1951.

Purging Connections

Differential pressure and pressure instruments in catalyst service, or other powdered solids service require very careful checking of the purging connections and the method of installation. Fig. 1 shows a method of installation which has proved very effective in minimizing maintenance due to plugged taps.

The pressure transmitter is located **above** the taps, with purge at the taps. In this manner gravity helps to keep the lines clear. Too often such an instrument is located for easy access rather than for proper operation, with the result that the tap is plugged and the instrument must be cut out of service while the lines are blown back.

Fig. 1—Method of locating pressure instruments in catalyst service.



Checking Transmitters

Transmitting instruments are best checked for output versus the variable they transmit. For example, a pressure transmitter may be checked for air output by means of a mercury manometer on the transmitted air line, with a portable oil pump and standard test gage connected to the pressure element. The receiver is then checked for calibration by applying air to it with the mercury manometer reading over the transmitted air range.

The transmission line is then connected, and the receiver is checked against the oil pump and test gage. If the calibration agrees, it indicates that the transmission tubing is free of leaks. A low reading on the receiver indicates a leak in the transmission tubing.

Another system of checking is to connect the transmitter and receiver to the transmission tubing, apply pressure to the pressure element with the oil pump and gage, and change either the transmitter or receiver linkage to make the two agree. This is not to be recommended, since either the transmitter, the receiver, or both may end up with a nonstandard calibration of, say 2 to 14 psi. of air over the transmission range rather than 3 to 15 psi.

This has the disadvantage that either the transmitter or the receiver cannot be bench tested and replaced without a complete calibration through the entire system. Further, a leak in the transmission line will then be compensated for by a change in the calibration linkage, rather than by repairing the link. Obviously a change in leakage of the tubing will result in a change in calibration.

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Pipe-Line Construction

FOLLOWING is a tabulation of pipeline projects which are planned or under construction. Included are crude-oil, products, and natural-gas lines. This list is compiled from surveys made by The Oil and Gas Journal.

Crude-Oil Pipe Lines

Alberta-Vancouver Oil Pipe Line Co.—(Brokaw, Dixon, McKee).—972 miles, 16-in., proposed, Edmonton via Pincher Creek, Alta., Idaho and Washington states to Vancouver, B. C.

Continental Pipe Line Co.—105 miles, 8-in., authorized, Rincon to northwest of Sullivan City on to Port Isabel, Tex. Completion date 1952.

Continental Pipe Line Co.—217 miles, 12-in., authorized, Wichita Falls, Tex., to Ponca City, Okla. Completion date 1952.

Derby Oil Co.—15 miles, 6-in., authorized Wichita to Bentley, Kans. Completion date 12-51.

Ohio Oil Co.—117 miles, 22-in., under way, Sheridan, Ind., to Lima, Ohio. R. A. Conyes, contractor.

Pan American Pipe Line Co.—27 miles, 26-in., Genoa to Texas City, Tex. Completion date 12-52.

Pan American Pipe Line Co.—40 miles, 14-in., Arden Station in Irion County to Eldorado Station in Schleicher County. 6-52.

Platte Pipe Line Co.—1,075 miles, 16-20-in., under way, Worland, Wyo., to Wood River, Ill. Completion date 1952.

Platte Pipe Line Co.—573 miles, 16-20-in., under way. Winchester, Wyo., to Brule, Neb. R. H. Fulton & Co. (Sections 1, 2, 3, and 4.—Section 1, 126 miles of 16-in., remainder 20-in.) A. A. Carrigan, spreadman at Casper, Wyo., field office.

Platte Pipe Line Co.—142 miles, 20-in., under way, near Marysville, Kans., to Holdredge, Neb. Bishop & Lock (Section 5); H. LaQuey, spreadman.

Platte Pipe Line Co.—100 miles, 20-in., under way, northern edge of Kansas. Rumsey Bros., contractor of Section 6.

Platte Pipe Line Co.—(Section 7), 274 miles, 20-in., Missouri River to Salisbury, Mo., and (Section 8) Salisbury to Mississippi River, under way, field office, Mexico, Mo.; B. C. Hall, spreadman; river crossing field office, Hartford, Ill., Dick Jernigan, spreadman.

Progress Pacific Pipe Line Co.—900 miles, 20-in., proposed, Permian basin, West Texas, to California.

Rancho Pipe Line System.—464 miles, 24-in., authorized, McCamey to Houston, Tex. Company crews. Completion date late 1952. (Joint project with Sinclair Pipe Line Co., Pan American Pipe Line Co., Tidewater Pipe Line Co., Nantucket Pipe Line Co., and Phillips Pipe Line Co., with Shell Pipe Line Corp. handling construction and operation.)

Roosevelt Oil & Refining Corp.—22 miles, 4 and 6-in., authorized, St. Helens to Norwich, Mich.

Service Pipe Line Co.—19 miles, 16-in., under way, Raytown to Sugar Creek refinery, Mo. Sheehan Pipe Line Const. Co., contractor. J. W. Brown, spreadman at Raytown, Mo.

Service Pipe Line Co.—29 miles, 20-in., authorized; Drumright, Okla., to Humboldt, Kans.; 30 miles, 20-in., contracted, Freeman to La Plata, Mo., G. G. Griffis Const. Co.; 24 miles, 10-in., contracted, Denton, N. M., to Wasson, Tex., Crossley and Hardy, contractor.

Shell Pipe Line Corp.—66 miles, 8-in., authorized, Gohlke to La Grange, Tex. Company crews. Completion date 1952.

Sinclair Pipe Line Co.—674 miles, 22-24-in., authorized; Drumright, Okla., to E. Chicago, Ind. Completion date 1952.

Texas Pipe Line Co.—319 miles, 22, 12, 10-in., Louisiana Gulf Coast to Port Arthur, Tex., including 220 miles, 22-in., Houma, La., to Port Arthur, Tex.; 31 miles, 12¾-in., Houma to Cocodrie, La. Completion date in summer 1952.

West Texas Gulf Pipe Line Co.—467 miles, 26-in., authorized, Colorado City to Wortham, Tex., 26-in.; Wortham to Sour Lake, Tex., 24-in. Completion date 10-52.

West Texas Gulf Pipe Line Co.—114 miles, 20-in., authorized, Wortham to Longview, Tex. Completion date 10-52.

Products Pipe Lines

Bell Oil & Gas Co.—150 miles, 6-in., planned, Ardmore to Drumright, Okla. (Includes 114 miles, 8-in.; 32 miles, 6-in.)

Buckeye Pipe Line Co.—370 miles, 8, 12, 16-in., authorized, Linden, N. J., via Allentown, Pa., to Auburn, Syracuse, Waterloo, and Rochester, N. Y. (Sections divided as follows: 75 miles, 16-in., 218 miles, 12-in., 77 miles, 8-in.) Start 1952, completion of 16-in., 1952, balance 1953.

Ohio Oil Co.—24 miles, 8-in., authorized, East St. Louis to Wood River, Ill.

Phillips Oil Co.—28 miles, 12-in., authorized, Sweeny to Freeport, Tex.

Phillips Pipe Line Co.—68 miles, 12¾-in., under way, Osawatomie westward to Wichita, Kans. Brown Lite Co. R. E. Carriker, spreadman at Osawatomie, Kans.

Phillips Pipe Line Co.—40 miles, 10-in., through Monteau, Cole, Osage, and Gasconade counties, Missouri. Trojan Const. Co. E. L. Maggard, spreadman at Linn, Mo.

Phillips Pipe Line Co.—46 miles, 12-in., under way, looping from Buffalo, Okla., to Borger, Tex. Arey Phillips Const. Co. 10-51 completion date.

Phillips Pipe Line Co.—48 miles, 12-in., under way, looping from Wichita, Kans., to Buffalo, Okla. G. G. Griffis Const. Co. Joe Bishop, spreadman, at Wichita, Kans. 11-51 completion date.

Phillips Pipe Line Co.—74 miles, 8-in., under way, looping from Decatur, Ill., to East Chicago, Ind. Somerville Const. Co., contractor. 12-51 completion date.

Phillips Pipe Line Co.—69 miles, 12-in., authorized, looping from Paola to Wichita, Kans.

Phillips Pipe Line Co.—137 miles, 10-in., authorized, looping from Paola, Kans., to East St. Louis, Ill. Completion date 11-51.

Progress Pacific Pipe Line Co.—900 miles, 10-in., proposed, California to West Texas.

Salt Lake Pipe Line Co.—Proposed, Pasco, Wash., to Puget Sound.

Shell Oil Co.—565 miles, 8-14-in., contracted, Wood River via East Chicago to Detroit; 35 miles, 14-in. Completion date summer of 1952.

Sinclair Pipe Line Co.—8-in., proposed, Sinclair, Wyo., to Salt Lake City, Utah; 10-in., Houston to Baton Rouge; 16-in., Kalamazoo to Detroit; 20-in. Marcus Hook to aByonne, N. J.; East Chicago to South Bend, Ind.

Socony-Vacuum Oil Co., Inc.—181 miles, 6-8-in., contracted, Augusta, Kans., to Kansas City, Mo. Ray L. Smith & Son, Inc. (Spreadmen are located as follows: Dewey Whitworth at Topeka, Kans.; Carl Samuel Colvin at Burlingame, Kans.; George Kelpar at Topeka, Kans.; Clark Liggett, Tonganoxie, Kans.) Completion date 1-1-52.

Standard Oil Co. (Ind.).—122 miles, 8-in., under way, Neodesha, Kans., to Belton, Mo. Bills & Troth Construction Co., Carl Bills, superintendent, at Armory Building, Neodesha. Completion date 1952.

Standard Oil Co. (Ohio).—17 miles, 6-in., authorized, Toledo to West Toledo, Ohio.

Tuscarora Oil Co., Ltd.—61 miles, 10-in., authorized, Knappenberger to Midland, Pa.

United States Pipe Line Co.—1,000 miles, proposed, Gulf Coast via Memphis, Nashville, Tenn., Lexington, and Paducah, Ky., to Cincinnati, Ohio.

Natural-Gas Pipe Lines

Allied Gas Co.—24 miles, 6⅝-in., proposed. McLean to Champaign County, Illinois.

Amere Gas Utilities Co.—11 miles, 8-in., authorized KA-5 loop, Princeton and Athens, W. Va. Completion date December 1951.

Amere Gas Utilities Co.—16 miles, 8⅝-in., proposed, loops from Mercer County to Princeton, W. Va.

Amere Gas Utilities Co.—15 miles, 8⅝-in., proposed, near Dameron to Flat Top, W. Va.

Arkansas Louisiana Gas Co.—16 miles, 8⅝-in., Claiborne Parish to Columbia County, Arkansas.

Associated Natural Gas Co.—88 miles, authorized, Missouri.

Associated Natural Gas Co.—14 miles, 6-in., under way, Sikeston to Charleston, Mo. Boot Heel Construction Co. Completion date 12-1-51.

Carolina Natural Gas Corp.—185 miles, 2-12-in., proposed, lateral lines off Transcontinental in North and South Carolina.

Cities Service Co.—80 miles, 4-22-in., under way, Grant, Haskell, and Seward counties, Kansas. Cheek Construction Co Completion date 12-1-51.

Cities Service Gas Co.—179 miles, 4-30-in., gathering system in vicinity of Ulysses, Kans. Vaughn & Taylor Const. Co., Inc. D. D. Vaughn, spreadman, Ulysses.

Coast Counties Gas & Electric Co.—40 miles, 3, 4, and 8-in., planned. Coast and Valley region, California.

Colorado Interstate Gas Co.—250 miles, 20-in., under way, Kit Carson, Colo., to Amarillo, Tex. R. H. Fulton & Co., contractor. Jerry Nash, spreadman at Lamar, Colo.

Commonwealth Natural Gas Corp.—537 miles, 20-in., proposed, West Bend, Ky., to Norfolk, Va.

Consolidated Gas Utilities Corp.—24 miles, 10¾-in., authorized, Marlow field to Fort Sill, Okla. Completion date 12-1-51.

Cumberland and Allegheny Gas Co.—46 miles, 10-in., authorized, Mountain Lake Park, Md., to Preston County, W. Va.

Dow Chemical Co.—70 miles, various sizes. Midland, Saginaw, and Bay City, Mich.; Mahoney Contracting Co., contractor, Ralph Bucher, spreadman at Midland.

East Ohio Gas Co.—65 miles, 26-in., under way, near Petersburg to Cleveland, Ohio. Williams Bros., contractor. Completion date 12-1-51.

East Tennessee Natural Gas Co.—172 miles, 22-in., authorized, Greenbrier to Oak Ridge, Tenn.

East Tennessee Natural Gas Co.—100 miles, 16-in., proposed, Knoxville to Kingsport, Tenn.

El Paso Natural Gas Co.—122.9 miles, 30-in., proposed, looping along main line in Texas, New Mexico, Arizona.

Empire Southern Gas Co.—22 miles, 2-3-4-in., authorized, Ozona, Crockett County, Texas, to Ozona Distribution system.

Equitable Gas Co.—17 miles, 16-in., under way, near Pittsburgh. H. L. Gentry Const. Co., contractor. Lavern Curtis, spreadman at Sewickley, Pa.

Georgia Gas Co.—32 miles, 4½-in., proposed, Bogart to Gainesville, Ga.

Glacier Gas Co.—285 miles, 20-in., proposed, Kalispell, Mont., to Spokane, Wash.

Glacier Gas Co.—120 miles, 16-in., proposed, Spokane to Hanford, Wash.

Glacier Gas Co.—91 miles, 8⅝-in., proposed, Spokane to Lewiston, Idaho.

Glacier Gas Co.—130 miles, 12¾-in., proposed, Spokane to International boundary at Trail, British Columbia.

Grand Valley Pipe Line Co.—105 miles, 8-10-in., planned, Piceance Creek field to Rifle on to Grand Junction, Colo.

Gulf Michigan Transmission Corp.—680 miles, 30-in., proposed, Perryville, La., across Arkansas, Missouri, and Illinois to terminus near St. John, Ind.

Home Gas Co.—17 miles, 12-in., proposed, loops from Hancock to Sanford, N. Y.

Iowa-Illinois Gas & Electric Co.—41 miles, 10-in., authorized, Washington County to Cedar Rapids, Iowa.

Kansas-Nebraska Natural Gas Co.—40 miles, 6-in., under way. Albion to Norfolk, Neb. Jayhawk Const. Co., Inc., contractor; F. A. Faler, spreadman at Albion.

Kansas-Nebraska Natural Gas Co.—30 miles, 6-in., under way, Albion to Neligh, Neb. Jayhawk Const. Co., Inc., F. A. Faler, spreadman at Albion.

Kansas-Nebraska Natural Gas Co., Inc.—60 miles, 8-10-12-in., under way, Grand Island to Albion, Neb.

Kansas-Nebraska Natural Gas Co.—65 miles, 2-8-in., planned, Big Springs field to Ogallala, Neb., and to Ovid, Colo.

Kansas-Nebraska Natural Gas Co., Inc.—39 miles, 4 and 6-in., planned, Neligh to O'Neill, Neb., 54 miles, 4 and 6-in. planned, Neligh to Hartington, Neb. (extension). Completion date 1952.

Kansas Power & Light Co.—27 miles, 20-in., authorized, Pratt, Kans., to Calista compressor station.

Lake Shore Pipe Line Co.—45 miles, 10¾-in., authorized, northwesterly from T.G.T. system near Meadville, Pa., to Ashtabula, Ohio.

Michigan Gas Storage Co.—78 miles, 16-22-24-in., authorized, Laingsburg to near Pontiac and Mount Clemens, Mich. (Includes 17 miles of lateral lines.)

Michigan Gas Storage Co.—30 miles, 26-in., authorized, looping between Laingsburg and Mount Pleasant Junction, Mich.

Michigan Gas Utilities Co.—77 miles, under way, Sturgis, Hillsdale, and Coldwater, Mich. (22.7 miles, Marshall south to Coldwater; 20 miles, Coldwater easterly to Hillsdale; 22.5 miles, Hillsdale to Sturgis; 11 miles, Hillsdale to Jonesville.) Somerville Const., contractor. Jim Godwin at Coldwater. Completion date 12-10-51.

MidSouth Gas Co.—240 miles, proposed. Greene, Poinsett, Crittenden, St. Francis, Lee, Phillips, Monroe, Woodruff, and Cross counties, Arkansas.

Mississippi River Fuel Corp.—98 miles, 16- and 18-in., authorized, feeder line from Lin-

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STANDARD GRADE
For service in temperature ranges from 32° to 120° F.

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coln Parish, Louisiana, to Waskom field, Harrison County, Texas.

Mississippi River Fuel Corp.—40 miles, 18-in., authorized, Dubach to Perryville, La.

Montana Power Co.—52 miles, 16-in., authorized, Canada-Montana border to Cut Bank, Mont.

National Utilities Co. of Michigan.—76.7 miles, 20-in., proposed, South Central Michigan. (22 miles from near Marshall south to Coldwater; 20 miles east to Hillsdale; 22 miles southwest to Sturgis; 5 miles from Hillsdale to Jonesville and 6 miles west to Union City.)

Nevada Natural Gas Pipe Line Co.—114 miles, proposed, Topock, Ariz., to Las Vegas, Nev.

New River Gas Co.—50 miles, planned, Summers or Monroe counties, West Virginia to Narrows and Dublin, W. Va.

New York State Natural Gas Corp.—66 miles, 20-in., proposed, looping on Westmoreland, Armstrong, and Tioga counties, Pennsylvania. (Includes 17 miles, 16-in. in Potter County, Pennsylvania, and 21 miles 14 in., replacement in Line No. 507, New York.)

Niagara Mohawk Power Corp.—40 miles, 10-12-16-in., under way, lateral lines at Utica, N. Y.; 55 miles, 10-in., Fulton to Watertown, N. Y.; Williams-Austin Co., contractor, Howard Bauer, supt.

Northeastern Gas Transmission Co.—511 miles, 20-24-in., authorized, New Hampshire, Massachusetts, and Connecticut.

Northeastern Gas Co.—411 miles, proposed, New England towns.

Northern Natural Gas Co.—580 miles, proposed, Kansas, Texas, Oklahoma, and Nebraska loops.

Northern Natural Gas Co.—370 miles, 4-26-in., authorized, gathering lines in Hugoton field.

Northern Natural Gas Co.—217 miles, 26-in., under way, Palmyra, Neb., to Skellyville, Tex. G. G. Griffis Const. Co., contractor; field office, Beatrice, Neb.; G. L. Mims, superintendent; E. G. Grisham, spreadman.

Northern Natural Gas Co.—210 miles, 26-in., proposed, five loops in Texas-Oklahoma area, two in Kansas, and two in Nebraska.

Northern Natural Gas Co.—181 miles, 4-12-in., contracted, gathering system in Hugoton area. Reese Bros. Const., contractor. Completion date in spring.

Northern Natural Gas Co.—106 miles, 26-in., under way, Beatrice, Neb., to Mullenville, Kans. G. G. Griffis Const. Co. G. L. Mims, spreadman at Beatrice, Neb. Completion date 12-1-51.

Northern Indiana Fuel & Light Co.—33 in., authorized, Perryville Station, La., to Boeuf River.

Northwest Natural Gas Co.—750 miles, planned, Washington, Oregon, and Idaho.

Ohio Fuel Gas Co.—25 miles, 20-in., contracted, Xenia, Ohio. Sheehan Pipe Line Const. Co.

Ohio Fuel Gas Co.—22 miles, 16-in., authorized, Dayton, Troy, Piqua, and Sidney, Ohio.

Ohio Fuel Gas Co.—23 miles, 16-20-in., authorized, Wellington to Elyria, Ohio; 16 miles, 20-in. authorized, Benton Station to Crawford Station, completion date 11-15-51. 18 miles, 20-in., Crawford Station to near Columbus, completion date 12-31-51. 16 miles, 16-in., authorized, Berlin Heights to Sandusky, Ohio, completion date 12-31-51.

Ohio Fuel Gas Co.—74 miles, 3 to 20-in., authorized, Hocking, Knox, and Ashland counties, Ohio.

Ohio Fuel Gas Co.—47 miles, 20-in., authorized, Benton Township, Hocking County, to Columbus, Ohio.

Ohio Fuel Gas Co.—61 miles, authorized northern and southwestern Ohio.

Oklahoma Natural Gas Co.—16 miles, 8⅝-in., authorized, Shamrock to Cushing, Okla.; 23 miles, 24-in., authorized, Depew to Kellyville, Okla.; 9 miles 12¾-in. Stroud to Depew, Okla.

Oklahoma Natural Gas Co.—40 miles, 16-in., under way, Ninnekah, Okla., to County Line, Okla.; Trojan Construction Co., contractor.

Oklahoma Natural Gas Co.—26 miles, 12-in., authorized, Ringwood to Enid, Okla. Completion date January 1952.

Oklahoma Natural Gas Co.—40 miles, 2-36-in., authorized, Ringwood field gathering system. Completion date January 1952.

Pacific Gas & Electric Co.—44 miles, 8-in., under way, Salinas to King City, Calif.

Pacific Gas & Electric Co.—141 miles, 34-in., proposed, parallel sections along Topock-Milpitas line.

Pacific Gas & Electric Co.—10 miles, 10-12-in., authorized, Monterey to Fort Ord to Castroville; 12 miles, 16-in., Napa Wye to Shellville; 6 miles, 12-in., Cotati to Santa Rosa, Calif.

Pacific Northwest Pipe Line Co.—400 miles, 22-in., gathering lines on Texas Gulf Coast to Pacific Northwest pipe line.

Pacific Northwest Gas Pipe Line Corp.—1,175 miles, planned, Wharton County, Texas, via Oklahoma, Kansas, Fort Collins, Colo., to Portland, Ore., Tacoma and Seattle, Wash.

Panhandle Eastern Pipe Line Co.—70 miles, 24-26-in., under way, looping from Sneed, Tex., to Emporia, Kans.

Panhandle Eastern Pipe Line Co.—174 miles, 30 and 26-in., contracted, Tuscola, Ill., eastward—looping present system; R. A. Conyes, contractor. 44 miles, 26-in., Edgerton, Mich.; Anderson Bros.; 22 miles, 30-in., looping in Tuscola, Ill.,; 45 miles, 30-in., looping in Montezuma, Ind.; 63 miles, 30-in., looping in Zionsville, Ind.

Pennsylvania Gas Co.—52 miles, 12-in., between Warren and Erie, Pa. (Section 1—27 miles, under way and contracted by Harford Bros. Section 2—25 miles.

Peoples Natural Gas Co.—25 miles, proposed, Cambria and Blair counties, Pennsylvania.

Phillips Natural Gas Co.—20 miles, 8-in., under way, Blue Lake to Chocolate Bayou, Tex. 10-51 completion date.

Phillips Petroleum Co.—118 miles, 3-22-in., under way, Sherman and Hansford counties, Texas, gas-gathering system; Vaughn & Taylor Construction Co., Inc., Dumas,

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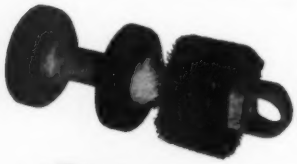

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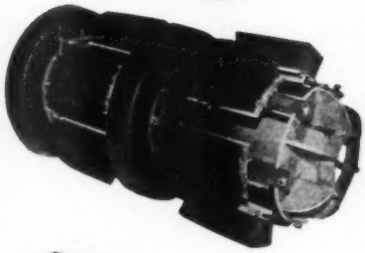
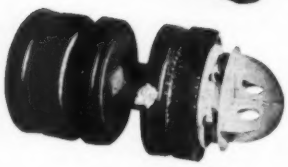


Type GP-4 Pig 16" to 30" sizes. Similar design for 10" to 14" sizes. Brushes expanded by arched springs. Brush & cup service life up to 1,000 miles.



Type RC-50 Pig 8" to 14" sizes. 6" size, similar, type SC-50. Jet-rotation feature distributes wear of brushes and cups.

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TULSA 9, OKLAHOMA

Tex., J. F. Crawford, spreadman at Texhoma, Okla.

Piedmont Natural Gas Co.—28 miles, 6-in., proposed, North Carolina, laterals from Transcontinental gas system.

Prince George's Gas Corp.—20 miles, 22-in., authorized, between Chillum and Rockville, Md.

Public Service Co. of North Carolina.—33 miles, 10-in., authorized, Burlington to Chapel Hill, N. C., completion date 3-1-52; 16 miles, 8-in., authorized, Chapel Hill to Raleigh, N. C., completion date 7-1-52; 29 miles, 4-in., authorized, Statesville to Kanapolis, N. C., completion date 7-1-52; 83 miles, 8-in., authorized, Kings Mountain to Asheville, N. C., completion date 3-1-53.

Rockland Light & Power Co.—22 miles, 8-in., proposed, Orangetown to Tompkins Cove, N. Y.

Southern California Gas Co.—24 miles, 30-in., under way, Inglewood to San Fernando Valley, California. Alex Robertson Co., contractor. Completion date 11-51.

Southern California Gas Co.—35 miles, planned, Antelope Valley, California.

Southern California Gas Co. and Southern Counties Gas Co. of Calif.—45 miles, 30-in., proposed, looping on line from Arizona border to Los Angeles.

Southern California Gas Co. and Southern Counties Gas Co.—36 miles, 6-8-in., contracted, Palmdale to Mojave, Calif., Alex Robertson Co., contractor, E. C. Neal, spreadman at Lancaster, Calif., completion date 11-1-51.

Southern California Gas Co. and Southern Counties Gas Co. of California.—81 miles, 30-in., proposed, Whitewater to Desert Center, Calif.

Southern Natural Gas Co.—21 miles, 24-miles, 8-in., proposed, Edgerton to Auburn, Ind.

Southern Natural Gas Co.—14 miles, 24-in., authorized, Onward Station, Miss., to Big Sunflower River.

Southern Natural Gas Co.—14 miles, 14-in., authorized, Perryville Station, La., to Wilhite Gate.

Southern Natural Gas Co.—375 miles, 24-in., planned, Gwinville, Miss., to Atlanta, Ga.

Southern Natural Gas Co.—169 miles, proposed loops, Ouachita Parish, Louisiana, to Augusta, Ga.; 20 miles in Ouachita Parish, 33 miles in Ouachita and West Carroll parishes; 7 miles, Sharkey County, Mississippi; and 108 miles, 14-in., Bass Junction to Augusta, Ga.

Southern Union Gas Co.—15 miles, 20-in., authorized, Albuquerque main line; 18 miles, 8⅝-in., authorized, Clovis to Portales, N. M., completion date 12-51.

Southwest Gas Corp., Ltd.—26 miles, proposed, from P.G.&E. line to Victorville, Calif.

Sunray Oil Corp.—133 miles, 3-30-in., under way, system for Snyder gasoline plant. Vaughn & Taylor Construction Co., contractor. D. D. Vaughn, spreadman.

Tennessee Gas Transmission Co.—521 miles, planned, looping along present system; 420 miles, 30-in., Texas, La., Ark., Miss., Tenn., and Ky.; 101 miles, 26-in., in Kentucky and Ohio.

The Texas Co.—27 miles, 8-in., authorized, Ventura to Filmore, Calif.

Texas Eastern Transmission Co.—83 miles, 30-in., under way, Columbia to Lafayette, Tenn. H. B. Zachry Co. A. Vaughn, spreadman at Lebanon, Tenn. Completion date 12-10-51.

Texas Eastern Transmission Corp.—217 miles, under way, Portsmouth, Ohio to point to near Connellsville, Pa. (Section 8) 77 miles, 30-in., Portsmouth to Amesville, Ohio; (Section 9) 74 miles, 30-in., under way, Amesville to Ohio-West Virginia river crossing; (Section 10) 66 miles, 30-in., under way, Ohio River to Connellsville, Pa.

Texas Eastern Transmission Corp.—791 miles, 30-in., under way, Kosciusko, Miss., to Connellsville, Pa.

Texas Eastern Transmission Corp.—50 miles, 30-in., under way, Ohio River to Vanceburg, Ky. Trojan Construction Co., Inc., contractor. Charles Tillotson, spreadman at Winchester, Ky.

Texas Eastern Transmission Corp.—79 miles, 30-in., under way, Cumberland River to Columbia, Ky. Oman Construction Co., contractor. William Smith, superintendent, and Floyd Hudnell, spreadman at Columbia, Ky.

Texas Eastern Transmission Corp.—76 miles, 30-in., Columbia, Ky., to Hartsville, Tenn. Oman Construction Co. A. H. Hobson, spreadman at Columbia.

Texas Gas Transmission Corp.—35 miles, 12-in., authorized, Slaughters, Ky., to Evansville, Ind.

Texas Gas Transmission Corp.—189 miles, 26-in., authorized, Acadia Parish to connection with existing facilities in Morehouse Parish.

Texas Gas Transmission Corp.—195 miles, 26-in., proposed, Gulf Coast region to southwestern Louisiana.

Texas Gas Transmission Corp.—425 miles, 26-in., authorized, looping from Bastrop, La., to Hardinsburg, Ky.

Texas Gas Transmission Corp.—181 miles, 26-in., under way, Bastrop to Eunice, La., Houston Contracting Co. (North spread near Beekman, 65 miles south to Grayson, La., W. H. Hayes, supt.; center spread, north side of Red River at Pineville, 60 miles north to Grayson, E. C. Norris, supt.; south spread, south side of Red River, 56 miles south to Tepetate field near Eunice, F. A. Silar, supt.)

Texas Gas Transmission Corp.—560 miles, 26-in., proposed, Louisiana and Kentucky.

Texas-Ohio Gas Co.—1,350 miles, 30-in., proposed, Hidalgo County, Texas, through Arkansas, Mississippi, Tennessee, and Kentucky on to Spencer, W. Va.

Union Gas & Electric Co.—35 miles, 8-in., Bloomington to Harris, Ill. O. R. Burden Const. Co., contractor. Floyd Lewis, spreadman at Bloomington, Ill. Fall completion date.

Union Gas & Electric Co.—33 miles, 8-in., Farmer City to Bloomington, Ill. Contracting & Material Co. A. T. Perry, spreadman at LeRoy, Ill. Completion date 12-15-51.

Union Oil Co. of California.—40 miles,

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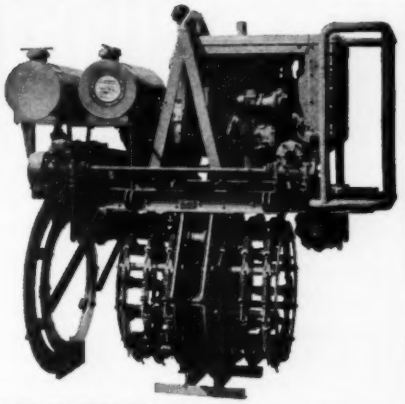

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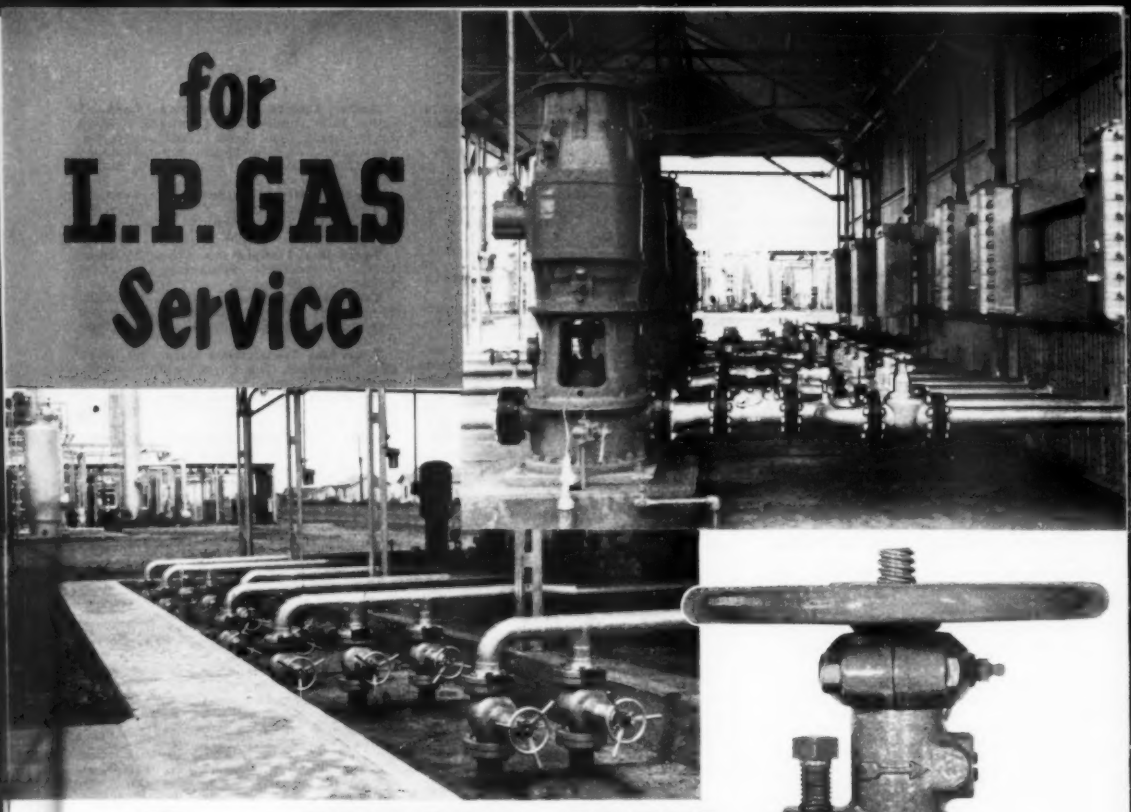

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8-10-in., planned, San Joaquin Valley and Los Angeles Basin.

United Fuel Gas Co.—32 miles, 20-in., under way, Lanham to Broad Run, W. Va. H. L. Gentry Construction Co., contractor. Frank Morris, spreadman at Charleston, W. Va.

United Gas Pipe Line Corp.—315 miles, 24-30-in., contracted, Agua Dulce to near Goodrich, Tex. Oklahoma Contracting Co., contractor.

United Gas Pipe Line Co.—93 miles, 20-24-26-in., under way, Houston to Du Pont's Sabine River Works, Orange, Tex. River Const. Co.

United Gas Pipe Line Co.—50 miles, 16-in., authorized, Baldwin County, Alabama, southeasterly to Escambia County, Florida.

United Gas Pipe Line Co.—100 miles, 20-24-26-in., contracted, near Houma to Franklin, La.; Associated Pipe Line Contractors, Inc.

United Gas Pipe Line Corp.—510 miles, 24-26-30-in., contracted, Agua Dulce, Tex., to Monroe, La.; 233 miles, 30-in., Jackson comp. sta., Miss. to Texas Eastern Trans. Corp.; 124 miles, Sterlington comp. sta. near Monroe, La., to Jackson comp. sta., Miss.; 23 miles, 8-12-16-in., South Louisiana facilities; all contracted by Gulf Southern Contractors, a joint venture including Texas Louisiana Contractors; Oklahoma Contracting Co.; J. Ray McDermott and Morrison Knudson. Inspection by Brown & Root, Inc.

United Gas Pipe Line Co.—30-in., contracted, Gonzales, La., to Koscuisko, Miss. River Const. Corp. Completion date 11-51.

United Gas Pipe Line Co.—24-in., contracted, Baxterville, La., to McComb; River Construction Corp. Completion date 11-51.

United Gas Pipe Line Co.—65 miles, 30-in., under way, Gonzales, La., to Koscuisko, Miss. River Const. Corp. Red Tatum, spreadman at Hammond, La. Completion date 11-51.

United Gas Pipe Line Co.—43 miles, 24-in., under way, Baxterville, La., to McComb, Miss. River Const. Corp. Jim Reed, spreadman at Columbia, Miss. Completion date 11-1-51.

United Gas Pipe Line Co.—87 miles, 20-in., under way, State Line to Jackson, Miss. River Const. Corp. Merle Tatum, spreadman at McComb, Miss. Completion date 12-15-51.

U.S.E.D.—18 miles, $8\frac{5}{8}$-in., contracted, Norwalk to Long Beach, Calif. J. E. Young Pipeline Contractor, Inc.

Utah Natural Gas Co.—360 miles, 22-in., proposed, San Juan Basin area to Salt Lake, Utah.

Virginia Natural Gas Co.—153 miles, Buckingham to Richmond and Portsmouth, Va.

Western Kentucky Gas Co.—2 to 4-in., under way, additions to present system; Modern Welding Co., Inc., contractor.

Western Pipe Lines.—1,200 miles, 22-in., planned, southern Alberta to Duluth, Minn.

West Texas Gas Co.—27 miles, 10-in., authorized, Lubbock to Abernathy, Tex.

West Texas Gas Co.—32 miles, proposed, Potter and Randal counties, Texas.

Wisconsin Power Co.—21 miles, 8-in., under way, Fond-du-lac to Ripon, Wis. Somerville Const. Co., contractor, Russell Wright, spreadman at Fond-du-lac. Completion date 12-10-51.

Foreign Crude-Oil Pipe Lines—Planned and Under Way

Alberta Pacific Oil Pipe Line Co. (Brokaw, Dixon, McKee).—970 miles, 16-in., proposed. Edmonton south to Kingsgate, B. C., to Washington to Vancouver, B. C.

Cia. de Petroleo Ganso Azul, Ltd.—48 miles, 4-in., planned, Ganso Azul field to Pucalpa on upper Ucayali River, Peru.

Condor S.P.A. (Shell).—80 miles, planned, Genoa to Rho, near Milan, Italy.

Direccion General de Yacimientos Petroliferos Fiscales.—409 miles, under way, Plaza Huincul to Bahia Blanca, Argentina.

Independent Pipe Line Co.—721 miles, 16-18-22-in., proposed, Edmonton to Vancouver. Spreads as follows: 185 miles of 22-in.; 391 miles, 20-in.; 95 miles, 16-in.; and 30 miles, 18-in.

Iraq Government.—135 miles, 12-in., authorized, from Iraq Petroleum Co. at Baiji to Baghdad, Iraq. Construction 1952. M. W. Kellogg, contractor.

Iraq Petroleum Co., Ltd.—556 miles, 30-32-in., under way, Kirkuk, Iraq, to Banias, Syria, 1952; Bechtel-Kirkuk, contractor.

Iraq Petroleum Co., Ltd.—72 miles, $12\frac{3}{4}$-in., Zubair to Fao. Arabian Bechtel Co., contractor. Completion date 12-51.

Middle East Pipelines, Ltd.—800 miles, 34-35-in., planned, Iran to a Levantine port.

Petroleos Mexicanos.—145 miles, 12-in., considered, 18 de Marzo field via Reynosa to Monterrey, Mexico.

Petroleos Mexicanos.—100 miles, planned, Isthmus of Tehuantepec, Jose Colomo to El Plan field, Minatitlan.

Shell Caribbean Petroleum Co.—160 miles, 30-in., under way; Palmajero to terminals on the Paraguana Peninsula (Cardon and Las Piedras, Venezuela), 4-52. Land sections contracted by Williams Brothers, de Venezuela, S.A., Charles P. Williams, manager, Marvin E. Jones, superintendent. Water crossings contracted by Mahoney Contracting Co.

Texas Petroleum Co.—60 miles, 4-6-in., under way, Pto. Nino to La Dorada.

Trans-Mountain Oil Pipe Line Co.—715 miles, proposed, Edmonton, Alta., to Vancouver, B. C. Canadian Bechtel, Ltd., engineers.

Winnipeg Pipe Line Co., Ltd.—75 miles, 10-in., under way, Gretna to Winnipeg, Manitoba; Sparling-Fowler Co., Ltd.

Foreign Products Pipe Lines—Planned and Under Way

Colombia Ministry of Petroleum.—90 miles 6-in., planned, Puerto Berrio to La Dorada, Colombia.

Colombia Ministry of Petroleum.—113 miles, 6-in., contracted, Puerto Berrio to Acededo near Medellin, Colombia. Carolina Construction Co.

Colombian Ministry of Petroleum.—75 miles, 4-in., planned, Buena Ventura to Cali, Colombia.

Empresa de Ferrocarriles Ecuatorianos.—50 miles, 4-in., under way, Guayaquil to Palmira, Ecuador. J. A. Jones, contractor; C.R.C. Engineering Co., engineers.

Estrada de Ferro Santos a Jundiai.—32 miles, 18-in., under way, Santon to Sao Paulo, Brazil (fuel oil line); Techint, contractor. Completion date 12-51.

Governments of Southern Rhodesia and Portuguese East Africa.—200 miles, considered, Beria, Portuguese Mozambique to Umtali, Southern Rhodesia.

Imperial Oil Co., Ltd.—230 miles, 10-12-in., under way, Sarnia via London, Hamilton to Toronto, Ont., Canada. Comstock Midwestern, Ltd., contractor. Completion date July 1952.

Petrocongo (Sub. Cie. Financiere Belge des Petroles, S.A.).—225 miles, considered, Ango-Ango to Leopoldville, Belgian Congo.

Petroleos Mexicanos.—155 miles, 10-in., under way, Minatitlan to Salina Cruz, Mexico.

Societe des Transports Petroliers par Pipe Line.—140 miles, 10-in., under way, Le Havre to Paris, France. Entrepose, contractor. Completion date 1952.

State of Cundmamarca, Colombia.—120 miles, 6-in., Puerto Salgar to Bogota, Colombia; Williams Brothers Co.; David Louthen, manager, Bogota.

Trans-Northern Pipe Line Co.—400 miles, proposed, Hamilton, Ont., to Toronto, Ont., to Montreal, Que., Canada.

Foreign Natural-Gas Pipe Lines—Planned and Under Way

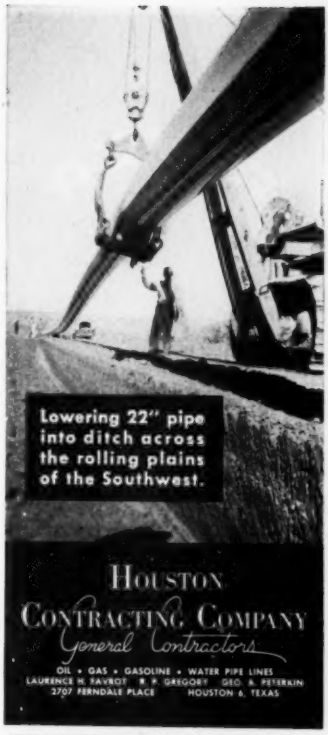
Azienda Generale Italiana Petroli.—110 miles, 12-14-16-in., planned, Cortemaggiore to Genoa.

Azienda Generale Italiana Petroli.—145 miles, 14-16-in., under way, Cortemaggiore to Torino. Completion date 1951.

Canadian Delhi Oil Co. (Subsidiary Delhi Oil Co.).—2,132 miles, proposed, Alberta, Toronto, Montreal.

Canadian-Montana Pipe Line Co.—68

(Continued on page 131)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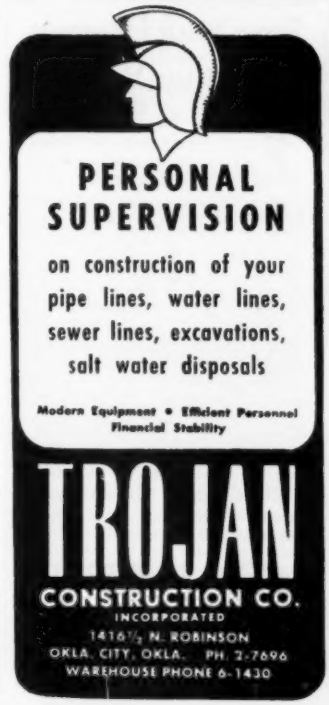

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PIPE LINES

Plantation Feat

Dedication set for huge 707-mile products system

ATLANTIC.—Plantation Pipe Line Co. will dedicate its new 707-mile products pipe-line system from Baton Rouge to Charlotte, N. C., December 4.

The huge line, built at a cost of $52,000,000, will increase Plantation's carrying capacity two and a half times. It parallels the company's older 12 and 10-in. line from Baton Rouge to Greensboro, N. C., which was built 10 years ago.

Construction of the line was started last year. About 432 miles of it, from Baton Rouge to Bremen, Ga., is 18-in. The remaining 275 miles from Bremen to Charlotte is 14-in.

The common carrier will carry products of 14 oil companies from their Texas and Louisiana refineries to terminals in Mississippi, Alabama, Georgia, North and South Carolina, and Tennessee. Products include gasoline, kerosine, tractor and diesel fuels, and heating oils.

Charles R. Younts, Plantation's president, said that the opening of the new line will raise the company's delivery rate from the present run of 4,000,000 gal. of products daily to 10,000,000 gal. early in 1952. "This rate can be increased another 50 per cent to keep pace with the South's future industrial growth by the addition of new pump stations," Younts said.

Completion of new tankage and pumping facilities at Bremen is scheduled for early next year. Meanwhile, the company is enlarging its 18 pump stations along its system. Stations will be located about every 60 miles along the line.

Principal speaker at the dedication ceremony December 4 will be Herman Talmadge, governor of Georgia.

Texas Pipe Line Contracts Laying of Big Crude System

HOUSTON. — Texas Pipe Line Co. has awarded contract for construction of more than 300 miles of crude-oil pipe lines to Houston Contracting Corp., of Houston, it was announced last week by R. B. McLaughlin, president of Texas Pipe Line.

Contract considerations was not revealed, but it was reported to be in the neighborhood of $18,000,000.

The work will involve laying of 220 miles of 22-in. line from Houma, La., to Port Arthur, Tex.; 28 miles of 12½-in. line from Houma to Cocodrie, La.; and a gathering system of about 60 miles of 6 to 10-in. pipe to serve fields in the Terrebonne Bay area of Louisiana *(The Oil and Gas Journal, November 1, page 92)*.

McLaughlin said first shipment of line pipe is expected early in January 1952, and that actual construction will start shortly thereafter. The system will bring crude oil from the Louisiana fields to The Texas Co.'s Port Arthur refinery.

Buckeye Gets Set

Right-of-way, engineering work pushed on new lines

NEW YORK. — Right-of-way work for Buckeye Pipe Line Co.'s new 370-mile eastern products pipe-line system is now nearing completion, and engineering is well advanced *(The Oil and Gas Journal, November 1, page 39)*.

Materials for the 75-mile 16-in. Linden, N. J.-Allentown, Pa., section have been allocated by the Petroleum Administration for Defense for delivery in the first quarter of 1952, and materials for the rest of the system are on order.

Pipe for the Linden-Allentown section will be fabricated by National Tube Co. and Youngstown Sheet & Tube Co. Construction headquarters for this spread will be in Allentown under the supervision of Floyd E. Warterfield, Jr., president of Pipe Line Engineering Co., Dallas, who has been retained to design and construct the project.

The Linden-Allentown section, to be completed next year, will handle about 100,000 bbl. per day. This leg will serve Tuscarora Oil Co., Ltd., whose newly laid products lines westward into Pennsylvania will connect to Buckeye at Allentown. The Buckeye 12-in. line to be laid from Allentown northward will serve the Scranton-Wilkes Barre area, Binghampton, Auburn, Syracuse, and Oswego, N. Y. An 8-in. leg will extend from Auburn to Rochester. At Allentown the Buckeye system will have a daily capacity for moving 40,000 to 50,000 bbl. of gasoline, kerosine, No. 2 fuel oil, and diesel oil. A number of oil companies including several majors will use the system for shipping products refined in Eastern Seaboard and Gulf Coast plants.

Manager named. — George L. Robinson has been named manager of Buckeye's newly organized Eastern Products Division, and will maintain headquarters at Allentown. Formation of the new division marks a change in the company's administrative set-up. The entire new system is now designated as one division of Buckeye.

Formerly the line was to have been built and operated by Buckeye through New Jersey and by two subsidiary companies, Northern Pipe Line Co. in Pennsylvania and New York Transit Co., Inc., in New York State. The company plans eventually to extend the new system from Rochester to Buffalo, where it will connect with existing Buckeye facilities to Cleveland and the Chicago area.

West Texas Gas Proposes System-Capacity Increase

WASHINGTON.—West Texas Gas Co., of Lubbock, Tex., plans construction of about 33 miles of new pipe line and compressor additions totaling 2,010 hp. on its natural-gas-transmission system in Potter and Randall counties, Texas. The company filed an application with the Federal Power Commission last week.

The facilities, estimated to cost $1,636,145, would increase the capacity of West Texas' system by about 24,000,000 cu. ft. per day to 135,000,000 cu. ft. per day.

The company also is proposing to salvage 25 miles of existing line which would be laid as a loop to its line south of McSpadden compressor station in Randall County.

West Texas' system extends from the Fritch area of Texas Panhandle gas field to the vicinity of Midland and Odessa, Tex., with lateral and supply lines extending to 47 communities in the Panhandle-South Plains area.

Pipe-Line Briefs

Central Kentucky Natural Gas Co., of Charleston, W. Va., has received the green light from the Federal Power Commission to build about 13 miles of 20-in. line to carry an additional 52,000,000 cu. ft. of gas per day to the Cincinnati area. The new line, estimated to cost $780,000, will parallel the company's existing 14-in. line extending northwest from North Means, Ky., and will raise capacity to meet estimated Cincinnati area requirements of 333,100,000 cu. ft. on the peak day in 1952.

Pipe-Line Constuction

(Continued from page 129)

miles, 4-16-in., under way, Pakowki Lake field to Alberta-Montana border.

Direccion General del Gas del Estado.—310 miles, 8-in., under way, Plaza Huincul to Neuquen, Argentina, to the vicinity of General Conesa, Argentina.

Northwest Natural Gas Co.—950 miles, 24-in., planned, Alberta fields to Vancouver, B. C., Seattle, Wash., and Portland, Ore.

Northwestern Utilities, Ltd.—35 miles, 16-in., authorized, Viking to Shonts, Alberta.

Petroleos Mexicanos.—205 miles, 16-in., considered, Monterrey to Torreon, Mexico.

Petroleos Mexicanos.—260 miles, 20-in., under way, Monterrey to Tampico and Poza Rica, Mexico.

Petroleos Mexicanos, Mexican Gas Co., and Industrial Gas Co.—600 miles, planned, Reynosa, Tamaulipas, to Tampico-Poza Rica, Mexico.

Trans-Canada Pipe Lines, Ltd.—Proposed, Alberta to Toronto to Montreal.

Venezuela Atlantic Transmission Corp.—195 miles, 10-12-16-in., under way, El Placer near Las Mercedes, State of Guarico to Caracas, La Guaria, Maracay, and Valencia. Contracted by Williams Brothers, de Venezuela, S.A., B. E. Barnes, manager.

Westcoast Transmission Co., Ltd.—1,110 miles, 24-in., planned, Dawson Creek, D. C., through Pine Pass and Fraser River Valley to Kamloops, Princeton, and Vancouver to Portland. Ford, Bacon & Davis, engineers.

Westcoast Transmission Co., Ltd.—280 miles, 20-in., planned, Pincher Creek to Montana on to Spokane, Wash. Ford, Bacon & Davis, engineers.

Western Pipe Lines.—1,200 miles, 22-in., planned, southern Alberta, Winnipeg, to Duluth, Minn.

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REFINING

Shell Plans $30,000,000 Expansion of Norco Plant

NEW ORLEANS. — Shell Oil Co. last week announced a $30,000,000 expansion and modernization program for its Norco, La., refinery in St. Charles Parish about 20 miles west of here.

The program will increase the refinery's output of petroleum products from 50,000 to 75,000 bbl. per day. The principal single unit will be a large new catalytic cracking plant.

Crude-distillation facilities will be increased, an alkylation plant added, and more storage tanks, cooling-water equipment, utility equipment, and other facilities installed.

The Norco expansion is part of Shell's nationwide construction program which will cost $100,000,000 and add almost 100,000 bbl. daily to company's output in this country.

P. E. Hurley, refinery manager, said recent discovery of new sources of crude in Louisiana has assured a demand for the new facilities and was the deciding factor in company plans to enlarge the Norco plant.

Addition of a cat cracker will make Norco independent in producing aviation gasoline of Shell's refinery at Houston which, in the past, has shipped high-octane base stock to Norco for blending.

Farmers Union Expansion Progressing at Laurel Plant

LAUREL, Mont. — Construction on units comprising a $3,500,000 expansion program at the Farmers Union Central Exchange, Inc., refinery here is about 15 per cent complete.

Two fractionation columns and several small vessels of the new catalytic cracking unit are now being set on foundations. The cracking unit, with other facilities, will increase crude-oil capacity from 8,500 to 12,000 bbl. per day and gasoline production from 3,500 to 5,500 bbl. per day.

The project calls for construction of a topping plant, a vacuum-asphalt plant, a gasoline-concentration unit, and a polymerization plant. All are designed by Universal Oil Products Co., Chicago. Contractor is Refinery Engineering Co., Tulsa.

In addition, seven buildings are being built. Foundations on four of the buildings are completed while those of the other three are under way.

A cooling tower with a capacity of 12,000 g.p.m. is virtually complete. Workmen are now installing induced-draft fans. Pumps serving the tower include three 7,000-g.p.m. and one 5,500-g.p.m. units. Two of the large pumps will be run by 275-hp. steam turbines, the other by a 275-hp. motor. The smaller unit will be run by a 125-hp. motor.

C. A. Cromwell, refinery superintendent, said the construction is expected to continue on schedule and is slated for completion about the end of next year.

Conoco Plans Platformer For Lake Charles Refinery

LAKE CHARLES, La. — Construction will start soon on a new platforming unit at Continental Oil Co.'s refinery here.

H. G. Osborn, vice president of manufacturing for Conoco, said the unit will have a daily charge capacity of 5,000 bbl. for aromatic production or 6,000 bbl. for motor fuel.

It will process coastal straightrun-gasoline charge stock with a 150°-220° boiling range for benzene and toluene manufacture and a 250°-400° cut for motor-fuel production.

Universal Oil Products Co., Chicago, will handle construction.

Richfield to Begin Work on Small Units of Big Program

LOS ANGELES.—Construction will get under way immediately on several small projects involved in Richfield Oil Corp.'s $43,107,000 expansion approved recently by the Defense Production Administration for Richfield's Watson refinery at Wilmington, Calif., near here.

Work to be undertaken at once includes installation of a new crude-oil heater, high-pressure boiler, and revamping of a thermal catalytic cracking unit from countercurrent to concurrent flow.

The entire program will be devoted to expansion of aviation-gasoline-production facilities. Types of large units in the program were withheld by DPA for "security reasons" *(The Oil and Gas Journal, October 22, page 49)*.

Permission for accelerated tax amortization was broken down in four certificates of necessity. They included 90 per cent of $4,399,000, 65 per cent of $23,643,000, 45 per cent of $12,765,000, and 15 per cent of $2,300,000.

New Processes to Feature 1952 Midyear Refining Meet

NEW YORK.—New refining processes will be thoroughly aired during two technical sessions at the midyear meeting of the American Petroleum

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Institute's Division of Refining in San Francisco, May 12-15, 1952.

W. L. Stewart, Jr., head of the Division of Refining, said that the program committee, directed by W. M. Holaday, of Socony-Vacuum Oil Co., Inc., has already received a number of offers of papers for these sessions and will accept additional papers from anyone with new information.

Offers should be addressed to F. W. Schumacher, Standard Oil Development Co., Linden, N. J., chairman of a subcommittee for developing the program, or to W. T. Gunn, director of the refining division in New York.

Lead From Defense Reserves Drawn for TEL, Other Uses

WASHINGTON. — President Truman has dipped into the national-defense stockpile to provide 30,000 tons of lead to keep the tetraethyl lead and other essential consumers going.

The lead will be released by the Munitions Board, as needed, for sale by the General Services Administration in accordance with allocations of the National Production Authority.

The use of lead from the stockpile was necessitated by the shortage resulting from a decline in imports. Imposition of a ceiling price of 19 cents a pound by the Office of Price Stabilization while foreign lead was selling at 22 cents dried up sources of the material on which users of the metal were depending to eke out inadequate supplies of domestic metal.

The President authorized the withdrawal at the request of Mobilization Director Charles E. Wilson with a proviso that a plan be developed for prompt repayment to the stockpile.

PAD Orders Reported Easing Aviation-Gasoline Shortage

WASHINGTON.—The aviation-gasolline situation has again been ironed out, and officials of the Petroleum Administration for Defense are confident that military and other needs can be met until such time as the armed services again increase their requirements.

As a result of PAD Orders 3 and 4, issued October 19 to boost the supply of aviation gasoline *(The Oil and Gas Journal, October 25, page 81)*, the 15-bbl. per day increase then necessary has been developed, and it has been possible to make additional quantities available to Asiatic Petroleum Co. to offset the loss of Iranian production.

At the present time, PAD officials said, the military is getting substantially all they need, and there is now no crisis anywhere abroad. Most of the air lines which had to curtail operations because of the shut down of the Abadan refinery have now been able to resume their schedules, with the possible exception of the India-Pakistan line.

New Type Flare Needed

CHICAGO.—Petroleum refineries need a new type of flare, according to W. L. Stewart, Jr., vice president of refining for the American Petroleum Institute.

One of the primary jobs of the A.P.I. committee on disposal of refinery wastes, headed by Dr. R. N. Giles, Standard Oil Co. (Ind.), is the development of a flare featuring smokeless operation over a wide range of loading, economy, safety, and reliability. The committee has extended an open invitation to anyone who thinks he can meet these requirements.

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NATURAL GAS

Bureau of Mines Releases First Production Report

WASHINGTON. — The Bureau of Mines has instituted quarterly statistics service on marketed production of natural gas. Its initial report places marketed production during the first 3 months of this year at 1,887,300,000 M.c.f. In the second quarter, marketed production stood at 1,784,400,000 M.c.f.

The report also shows that during the first quarter 82,600,000 M.c.f. of natural gas was taken from storage, and 107,000 M.c.f. was used for carbon black.

Broken down, the marketed production included 622,200,000 M.c.f. sold for residential use, 178,900,000 M.c.f. for commercial use, 771,300,000 M.c.f. for industrial consumption (including fuel used at petroleum refineries and cement plants), and 349,900,000 M.c.f. for field use.

Texas, with 923,800,000 M.c.f. marketed, ranked first among the states, followed in order by Louisiana with 261,600,000 M.c.f., Oklahoma with 162,800,000; California with 146,700,000; Kansas with 116,600,000; and New Mexico with 75,000,000.

During the second quarter 108,700,000 M.c.f. went to carbon-black plants, 89,600,000 M.c.f. to storage, 319,700,000 M.c.f. to residential users, 96,800,000 M.c.f. for commercial use, 859,200,000 M.c.f. for industrial consumption, and 322,000,000 M.c.f. for field use.

Marketed production in the second quarter found the major six gas-marketing states ranked in the same order as in the first. Texas marketed 918,300,000 M.c.f.; Louisiana 243,100,000, Oklahoma 145,600,000, California 128,500,000, Kansas 90,500,000, and New Mexico 72,500,000 M.c.f.

Commissions Realizing Rate Boosts Must Be Passed On

NEW YORK.—Regulatory commissions are beginning to realize that rate increases by natural-gas suppliers must be passed on through distributors to the ultimate consumers, Stuart M. Crocker, chairman of Columbia Gas System, Inc., said last week.

Crocker said natural-gas utilities face a severe cut in earnings unless these higher rates are granted. Columbia companies now have rate increases pending approval which total more than $8,000,000 annually.

Retail prices of natural gas are far too low in relation to the cost of coal or oil for heating, and this creates tremendous demand at a time when scarcity of steel for pipe-line construction restricts expansion. Despite restrictions on service extention, Columbia has found it necessary to take on 85,000 new house-heating customers this year, Crocker said.

The system now serves about 2,500,000 customers in seven states. Under average winter conditions, the company expects it should get by with no interruptions in domestic service this year, though industrial use may have to be curtailed.

Delays in completion of new pipeline facilities plus a sharp cold wave led to extensive curtailments in residential service last year as well as in deliveries to industrial and commercial customers.

Columbia expects gas sales to reach 460 billion cubic feet this year with peak-day requirements this winter reaching about 3 billion cubic feet. The system had a record 173 billion cubic feet in underground storage at the beginning of the current heating season.

Tennessee Achieves 1951 System-Expansion Goal

HOUSTON.—Gardiner Symonds, president of Tennessee Gas Transmission Co., announced last week that the company's 1951 goal of expanding system capacity by 20 per cent has been achieved.

Capacity now stands at 1.2 billion cubic feet of natural gas per day. This expansion has resulted from laying of about 1,300 miles of new pipe line during the year.

The construction, including the extensions to the New York-Massachusetts state line, now makes the system length of Tennessee Gas more than 2,000 miles, the longest in the nation, he said.

Deliveries of gas through the system during the third quarter of this year averaged more than a billion cubic feet of gas per day, or 42 per cent more than during the same period of 1950.

Big Mississippi Gas Sale

JACKSON.—An agreement for the sale of natural-gas properties of Mississippi Power & Light Co. to Equitable Securities Corp., of Nashville, was announced last week by Rex L. Brown, president.

The transaction involves about $11,000,000 of assets located in Mississippi and is the largest public-utility sale in the state's history, he said.

The transfer, to become effective in early 1952, will involve the organization of "a new company incorporated in Mississippi to be known as Mississippi Valley Gas Co." The proposed sale is reported subject to final approval by the Securities Exchange Commission and Federal Power Commission.

Gas Reaching Pittsburgh Area From New Leidy Field

PITTSBURGH, Pa. — Natural gas from Leidy field is now arriving in this area through a new 167-mile pipe line completed by Columbia Gas System, Inc.

Gas is being received through the $11,000,000 line at Irwin, 20 miles southeast of here. By January 1 it is expected that an extension of the line into the city will be completed.

Construction of the Leidy-field line began last April. It is the first into this area since the field was opened a year ago. Columbia officials said 55 wells are producing about 596,000,000 cu. ft. of gas daily at Leidy, and 48 more are being drilled.

Delta Gas-Price Hike O.K.'d

NEW ORLEANS.—The California Co. has been advised that, retroactive to October 1, 1951, a price of 10 cents per M.c.f. for natural gas produced in the delta area and sold to United Gas Pipe Line Co. has been approved by Office of Price Stabilization.

Fields affected are: Barataria, Bayou Perot, Delta Farms, Stella, West Barataria, and South Barataria in Jefferson, Lafourche, and Plaquemines parishes, Louisiana.

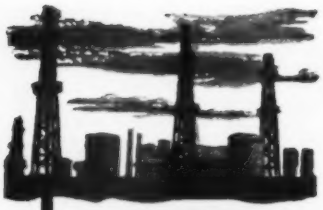
Natural Gasoline

Natural-Gasoline and L.P.G. Production Up in September

Total product output at natural-gasoline and cycling plants averaged 568,000 bbl. daily in September, according to data included in the monthly natural-gasoline report of the Bureau of Mines.

The September average represents a gain of 21,000 bbl. daily over August and 53,000 bbl. daily over September 1950.

Production of natural gasoline in the first 9 months of the year averaged 234,000 bbl. daily, up 10.2 per cent from the same period in 1950. Production of L.P.G. increased 24.4 per cent to an average of 233,000 bbl. daily for the 9-month period. Shipments of L.P.G. for fuel and chemical uses were up 26.4 per cent over the first 3 quarters of last year.



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Among the Drilling Contractors

Pike Extends Drilling To West Texas Region

Thomas P. Pike Drilling Co., Los Angeles, one of the most active drilling companies in California, is extending its operations to Texas, where its first well in that state is now being drilled for Mendota Oil Co. in the Midland area of West Texas.

The rig being used on the latter well was moved in from the Reynosa district of northeastern Mexico where the contractor had completed drilling a series of five contracted exploratory wells for E. W. Pauley. Tool pusher is Bill Klassen, who recently returned to the United States from Baja California, where he was tool pusher on a wildcat drilled by Pike for the Mexican government.

Ben F. Brack. Wichita, Kans., has a rig working for The Texas Co. on a wildcat location, 1 Ozman, in the SW SW SW 34-9n-44w, in the Amherst area, Phillips County, Colorado.

H. L. Rowley, Inc., Shreveport, La., has the contract for a test which Sinclair Oil & Gas Co. will drill in Coconino County, in the north central part of Arizona. Roads are now being built to the location in the C SW NE 35-28n-1w. Hole will be carried to the granite, expected around 4,500 ft. The test is on the operator's Santa Fe lease.

McCalman & Gunn. Shreveport, contracting for C. R. Schuster, Oil City, La., have skidded their rig from a recently completed Rodessa pay zone well in the Greenwood field, Caddo Parish, northwestern Louisiana, to a location 40 ft. south for a twin well to the Fredericksburg zone around 2,600 ft. These wells are on the operator's Grey lease in the NW SE NW 7-17n-15w.

Lyle & Simmons will be the contractors on a projected 3,200-ft. wildcat test which Ozark Oil Corp. of Casper, Wyo., will drill in the North Casper Creek area, Natrona County, Wyoming. Location, on government-owned land, is in the NE NW SE 1-36n-82w.

Barbour Drilling Co. Tulsa, has moved a rotary rig to a wildcat location 4 miles east of Stillwater Payne County, Oklahoma, where it will drill for Flynn Oil Co. The test, 1 Hunt, NE NE SE 2-19n-3e, is projected to 4,100 ft., which should carry it to the Mississippian. Location is 1½ miles north of the abandoned Stillwater pool.

Delaney Drilling Co., Tulsa, contractor on Blackwell Oil & Gas Co.'s newly completed Wilcox sand discovery well (1 Stewart) in western Payne County, Oklahoma, is starting another well for the same operator. The new operation, offsetting the discovery well to the east, is 1 Gerrish, NW NW SW 21-18n-1e. Pay zone in the discovery well is at a total depth of 5,238 ft.

Williams-Copeland, Inc., Tulsa, has a new operation under way in Grant County, Oklahoma. It is a wildcat test being drilled for The Texas Co. Location is 1½ miles southeast of Numa, in the NW NW NW 24-27n-4w, on the operator's Lehman lease. Contract is for 5,650 ft.

Blanton Drilling Co., Houston

Blanton Drilling Co., Houston, is one of the newest contract-drilling firms in the Texas Gulf Coast region. It originated in 1948 as Starworth Drilling Co. with Eddy C. Scurlock of Scurlock Oil Co., Houston, as principal owner. The present organization and name came into existence officially on February 22, 1951, following acquisition of the controlling interest in the firm by William N. Blanton, former executive vice president and general manager of the Houston Chamber of Commerce.

W. N. BLANTON

Main offices.—Headquarters of the company are maintained in the Gulf Building, Houston.

Officers.—Blanton is president; Scurlock is vice president; and Jack Blanton, son of the president, secretary-treasurer. D. A. Cammack is drilling superintendent.

Drilling rigs.—Currently, the company operates 1 steam and 3 power

rigs, all capable of drilling to depths of at least 10,000 ft. Present contracts are with Gulf Oil Corp. in the South Liberty field, Liberty County; The Texas Co. in the South Dayton field, also in Liberty County; Tennessee Production Co., in Jackson County; and H. R. Cullen, in DeWitt County.

Operations. — Since its inception, the company has concentrated its operations in the upper Gulf Coast counties of Texas, principally in the region extending from DeWitt County on the west to Hardin County on the east, or upper end. Its rigs have been on recent extension wells drilled for The Texas Co. at both the Cottonwood field in DeWitt County and the South Liberty field in Liberty County. Present operations are divided between drilling on flanks of piercement-type salt domes in Liberty County and in development of fault-line structures in updip trend areas of the Gulf Coast.

Miscellaneous. — Blanton, prior to his active connection with the new drilling company, spent 33 years in chamber of commerce work, 22 of which were in Houston. In this work, particularly at Houston and in previous connections at Amarillo, Tex., and Shreveport, he was associated closely with leading oil men and became intimate with their operating problems and conditions.

Fleet Drilling Co., Ada, Okla., has contracted with Ryan Oil Co. for a 10,500-ft. wildcat test to be drilled in northwestern Beckham County, in western Oklahoma. Location is on the operator's Gordon lease, in the C NW SE 20-10n-26w, 4 miles west of Mayfield.

Paul English, Farmington, N. M., contractor, is moving in rotary rig to the wildcat location in the Big Flat area of Grand County, Utah, where it will drill a projected 8,100-ft. test started by Glen M. Ruby in the SE NW NW 11-26s-19e. Hole already has been spudded with a cable-tool unit.

J. D. Ferrell Drilling Co., Great Bend, Kans., is making hole on a newly started wildcat test in the Northeast Peetz area, Logan County, Colorado. The test, 1 Phelps, SW SE SW 23-12n-51w, is being drilled for National Associated Petroleum Co.

R. L. Manning Co., Denver, is the contractor on a wildcat test which Phillips Petroleum Co. is starting on its Werner unit in Converse County, Wyoming. Location, first on the unit, is in the SE NE NE 20-37n-75w.

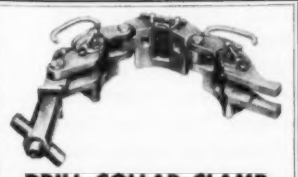
Jackson Drilling Corp., Wichita, has a rig working for Westgate-Greenland Oil Co. on a wildcat location, 1 Ward, in the NW NW SE 32-23-14, Stafford County, Kansas.

ACTIVE ROTARY RIGS*

(United States and Western Canada)

Area—	Week ended 11-19-51	Change week ended 11-12-51	Change week ended 11-20-50
Gulf Coast	651	— 7	+ 77
W. Tex.-N. M.	1,051	+12	+242
Ark.-N. La.-E. Tex.	188	+ 4	+ 29
Oklahoma	348	+57	+ 62
Kansas-S. Nebraska	196	+ 3	+ 38
Illinois-Eastern	145	+ 1	+ 1
Rocky Mountains	199	+ 8	+ 70
Pacific Coast	175	— 1	+ 41
Total U. S.	2,953	+77	+560
Western Canada	163	+ 9	+ 41
Total	3,116	+86	+601

*Courtesy Hughes Tool Co. Trends in drilling activity in the United States and the Rocky Mountains and western Canada areas are shown on pages 158 and 159.



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The "VARCO" Drill Collar clamp is a heavy duty safety device. No drill collar slips needed if used with heavy plate atop the master bushing. Movable slip inserts with VARCO buttons, complete within itself; no extra parts needed. For drill collar sizes 4½" to 8" inc. Chrome alloy heat treated steel. Write for complete data. A Tubing and Bailer Clamp of similar construction is available, handling sizes from 2⅜" to 4½".

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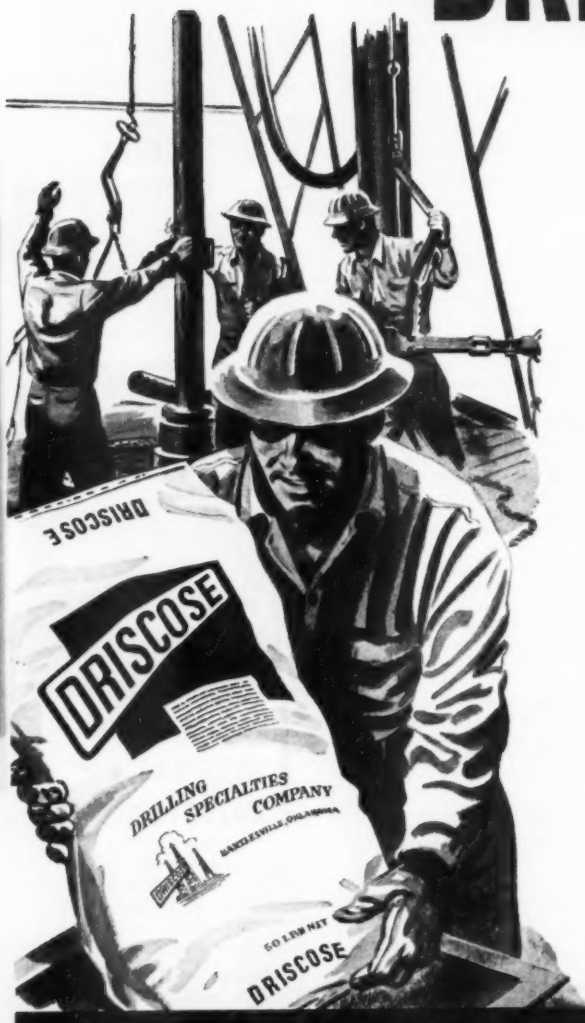

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DRILLING SPECIALTIES COMPANY

BARTLESVILLE, OKLAHOMA

New Aids for Seismologists

ONE of the great problems of oil-searching seismologists is the lack of knowledge about the speed at which the energy they develop by near-surface explosions travels through the rocks that lie beneath the immediate area in which they are attempting to develop a subsurface picture.

Ever since seismologists mastered a means of recording "time" in their simplified formula (travel time of the energy to a reflecting horizon multiplied by the average velocity of that energy equals the depth of the reflecting horizon) they have recognized the need for accurate velocity determinations.

These scientists have realized that unknown lateral variations of velocities result in anomalies on a seismograph map that may be interpreted as structural highs and lows, or formation thickenings and thinnings which do not actually exist. In fact this knowledge has been used to an advantage in locating certain types of stratigraphic traps.

As actual untested anomalies become smaller and smaller and traps without closed structures grow in importance, the need for accurate velocity determinations becomes more and more essential. Accurate velocity surveys can be and have been made, but they are few and far between in the wildcat areas where they are needed most.

Until recently velocity surveys have been made by lowering a seismometer into a well bore and exploding dynamite in a shot hole near the location of the well. This practice yields the over-all average velocity from the bottom of the shot hole to the depth that the geophone is suspended in the well, but it is expensive and inconvenient and therefore all too often neglected.

Methods to make the valuable velocity surveys less expensive, less inconvenient, and more uniform have been developed and are still being studied. A paper presented by F. P. Kokesh, Schlumberger Wells Surveys, at the first annual meeting of the Gulf Coast Association of Geological Societies in New Orleans, told how by reversing the present practice, as has been done by exploding dynamite caps in shallow wells with the seismometers placed on the surface, that many of the disadvantages of the older method are eliminated, principally the need for an entire seismograph crew. He also told that by using standard perforator guns loaded with bakelite bullets, velocity surveys down to nearly 5,000 ft. can be obtained and that initial experiments indicate that surveys to possibly 10,000 ft. might be obtained by exploding prima cord in a well. If these methods prove successful and acceptable the advantages of greater speed and less expense should result in more velocity surveys being made and the compilation of more complete seismic maps.

At the fifth annual midwestern meeting of the Society of Exploration Geophysicists held in Dallas, two papers on new, yet-to-be-perfected, well-bore velocity-logging instruments were presented—one by W. D. Mounce, C. L. Hubbard, C. J. Charske, and H. P. Kuppers, Humble Oil & Refining Co., and the other by G. C. Summers and R. A. Broding, Magnolia Petroleum Co. (By way of illustration of the importance attached to such aids to the seismologist, at least two other major-company research laboratories are working on the development of instruments designed for the same purpose).

These devices, though using different methods of instrumentation, both give accurate velocity measurements of the rocks encountered in a well bore by small (1 and 5-ft.) intervals. All of the potentialities of these independently developed instruments may not yet be fully realized, but a few of the immediate uses are of great import.

The data obtained from this log will give more clues to the proper interpretation of seismograph maps. The determination of interval velocities in specific locations is going to make possible better interpretation of "time thickness" maps and give a definite basis for the translation of these maps to feet and to actual depth. These continuous surveys add another log, another slant, and more data, to help the oil searcher. They will tell the seismologists more about reflections—probably where they develop and possibly why.

Philip C. Ingalls.

HIGHLIGHTS OF WEEK'S DEVELOPMENTS

WEST TEXAS.—Humble 1 TXL, Driver field extension, has narrowed the gap between Tex-Harvey and Driver to 2 miles. Completion was from pay at 7,145-8,107 ft. and flowing potential was 143.5 bbl. a day. North and south edge wells extended Wilshire Ellenburger production: Sinclair 3 Windham, on the south, flowed 1,557 bbl. of distillate a day from pay at 12,306-12,406 ft.; on the north, Sinclair 7 McElroy Ranch gaged 2,366 bbl. of high-gravity oil from pay at 12,324-12,432 ft. Both gages were through open 2-in. tubing.

SOUTH LOUISIANA.—A new horizon may be opened in Woodlawn field of Jefferson Davis Parish. A south extension to the field, Union Sulphur & Oil Co. 1 Walker et al., made 194 bbl. of oil from a perforated interval at 10,570-80 ft., deeper than other production.

ROCKY MOUNTAIN AREA.—Carter Oil Co. recovered some oil on drill-stem test in the Mesa Verde at the Willow Creek, Utah, wildcat. Shell Oil Co. found carbon dioxide gas with some distillate on test of the Mississippian at the Bluff Unit, southeastern Utah. Several Williston Basin wells are in testing stages, with Carter Oil Co. West Poplar, Montana, wildcat near top of Charles.

PIPE LINE BOOSTER PUMPING

MARLOW self-priming centrifugal pumps make it easy to dependably feed oil to the main lines of gathering systems. For example: The Marlow shown below is one of those in use at Shawnee, Oklahoma, transferring oil from isolated tank batteries at the rate of 120 bbls. per hour at 43 lbs. pressure.

A Marlow is so simple, rugged and foolproof that it requires practically no attention and will last indefinitely. You can rely on Marlow pumping.

As manufacturer of the world's largest line of self-priming centrifugal pumps, Marlow can help you to have a better gathering system. Write us about your problem without obligation.

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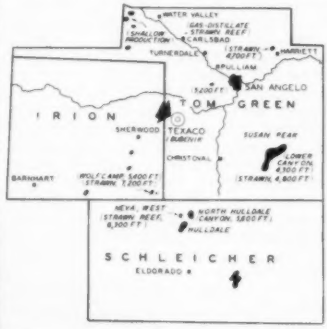
Permian Basin

New Pennsylvanian Discovery Indicated by Texas Wildcat

MIDLAND.—Southwestern Tom Green County had another Pennsylvanian discovery in the making, and both operators and those with nearby holdings were hopeful it would be a structure on the order of Susan Peak to the southeast. While it had given very good shows on drill-stem tests, the section had not been identified as to Canyon or Strawn.

The new prospect is The Texas Co. 1 Albert and Eddie Bubenik, 13 miles southwest of San Angelo on a 147½-acre tract in Section 826, Wilhelm Lueders Survey.

First drill-stem test to recover free oil was from 5,463-73 ft. in a lime and shale section. The tool was open 5 hours, and



recovery was 2,160 ft. of 28.5°-gravity oil plus 180 ft. of oil and gas-cut mud. A 3-hour test between 5,473-83 ft. recovered 5,265 ft. of 30°-gravity oil and 40 ft. of heavily oil and gas-cut mud.

Following acid treatment through perforations at 5,464-74 ft. and open hole at 5,473-83 ft., the well yielded 39 bbl. of fluid an hour which was mostly salt water. Operators believed the water was coming from the top 10 ft. of an indicated 20-ft. pay section and were running surveys before making further tests.

Just west of San Angelo, W. H. McKinney 1 Pulliam had total depth at 5,225 ft. and was shut down for repairs. The well had recovered some oil on drill-stem tests at 5,155-69 ft., identified as Palo Pinto. It was scheduled to drill to the Strawn then test back up the hole.

In Irion County, Moore Exploration Co. 1-P Noelke Estate, 13 miles southwest of Mertzon, sprayed oil and gas on a drill-stem test from 7,400-66 ft. and recovered mud and oil at 7,469-98 ft.

Southeast of Sonora in Sutton County, Pure Oil Co. 1 Allison, 7-B-HE&WT, cored Strawn lime with oil shows from 5,140-65 ft., and operators were running a drill-stem test of that section.

North of the Wilshire area in Upton County, Sinclair Oil & Gas Co. 6 McElroy prepared to core ahead after a 3-hour drill-stem test in the Ellenburger at 12,555-12,614 ft. developed only 90 ft. of mud.

Stanolind Oil & Gas Co. 1 McCutcheon, Jeff Davis County wildcat 20 miles northeast of Fort Davis, was shut down for orders. Top of the Ellenburger was reported at 11,550 ft., on elevation of 4,822 ft., and a test between 11,547-90 ft. developed 6,575 ft. of water. No shows had been reported in the higher formations.

In Midland County, Moore Exploration Co. 1 Dowlen-Houpt, which failed in the Pennsylvanian, was testing on perforations at 9,746-9,800 ft. in the Wolfcamp.

Gulf Oil Corp. 1 Windham, between Parks and Pegasus fields, was reported flowing load oil after treating with acid through perforations at 10,720-43 ft.

WEST TEXAS (DISTRICTS 8 AND 7-C) SUCCESSFUL WILDCATS

Coke County: Sun Oil Co. 1 Blanks-Perkins unit, Sec. 72, S. M. Conner Sur., TD 6,885 ft., perf. 6,011-22 ft., flowed 124.5 bbl. 45°-gravity oil, 14/64-in. choke, TP 375 psi., GOR 1,545 cu. ft.

Reagan County: Snowden Oil & Gas Co. 1 J. D. Merchant, 19-A-L&SV, TD 7,202 ft., elev. 2,686 ft., Spraberry 6,340 ft., pumped 80 bbl. 38°-gravity oil.

Runnels County: Gulf Plains Corp. 1 N. J. Whitely, I. P. Wallace Sur., TD 3,499 ft., elev. 2,007 ft., perf. 3,484-96 ft., flowed 75.8 bbl. oil, ¼-in. choke, TP 245 psi., GOR 2,150 cu. ft.

WEST TEXAS (DISTRICTS 8 AND 7-C) WILDCAT FAILURES

Crockett County: Terrell Petroleum Co. 1 J. S. Todd, 39-WX-GC&SF, dry, TD 1,868 ft.

Dickens County: N. B. Hunt 1 Pitchfork Land & Cattle Co., 7-1-Sam Lasarus Sur., dry, TD 6,665 ft.

Garza County: Continental Oil Co. 1 J. Bird, 28-7-H&GN, dry, TD 2,753 ft.

Irion County: M. J. & M & M Consolidated Co. 1-A Calvin H. Sugg, Sec. 1,948, A. E. Patton Sur., dry, TD 9,571 ft., elev. 2,449 ft., Spraberry 4,865 ft., Dean 6,336 ft., Wolfcamp 6,420 ft., Strawn 8,836 ft., Fusselman 9,190 ft., Ellenburger 9,460 ft.

Kent County: Seaboard and Republic Natural Gas 1-C Girard Trust, 15-1-H&GN, dry, TD 7,290 ft., elev. 2,130 ft., Pennsylvanian 6,664 ft., Mississippian 7,206 ft.

Martin County: Sinclair Oil & Gas Co. 1 Dickenson, 22-37-T1N-T&P, dry, TD 10,073 ft., elev. 2,797 ft., Spraberry 7,495 ft., Dean 8,805 ft., Pennsylvanian 10,481 ft., Mississippian 11,145 ft., Devonian 11,425 ft., Simpson 11,998 ft., Ellenburger 12,015 ft.

Pecos County: Brown & Thorp Drilling Co. 1 J. C. Vick, 23-11-H&GN, dry, TD 3,220 ft.

Hunt Oil Co. 34 Elsinore Royalty, 48-A-GC&SF, dry, TD 2,427 ft.

Runnels County: Dalport Oil Corp. 1 L. F. Smith, Blk. 45, H. A. Thompson Sur. 148, dry, TD 2,760 ft.

B. C. Morrison 1 Billie Hanks, Sec. 499, H. Chapman Sur., dry, TD 4,803 ft.

G. W. Strake 1-A P. F. White, HT&B Sur., dry, TD 4,352 ft., elev. 1,952 ft., Palo Pinto 3,404 ft., Morris 3,645 ft., Gardner 3,982 ft., Caddo 4,286 ft.

Schleicher County: National Associated Petroleum Co. 2 B. M. Boyd, 13-H-GH&SA, dry, TD 5,036 ft., elev. 2,321 ft., Canyon sand 4,495 ft., Strawn 4,617 ft.

Tom Green County: S. D. Johnson 1 J. W. Johnson, E. J. Wortham Sur., dry, TD 4,780 ft., elev. 1,835 ft., Strawn 4,720 ft.

Taylor Refining Co. 1 G. F. Rust, 19-A-TCRR, dry, TD 5,773 ft., elev. 2,310 ft., Palo Pinto 4,156 ft., reef 4,880 ft., Ellenburger 5,270 ft.

TEXAS PANHANDLE (DISTRICT 10)

AMARILLO.—Completion of another successful wildcat in the tricky Lips field area of Ochiltree and Roberts counties has extended the pay zone in the field at least 2 miles further southeast.

Calculated open flow of Sinclair Oil & Gas Co. 7 Charles Lips is 19,200,000 cu. ft. of gas per day, with 10 bbl. of condensate per million feet. Rock pressure is 2,740 psi. and maximum shut-in casing pressure 2,122 psi.

Production at Lips is coming from the Atoka formation of lower Pennsylvanian age, through perforations from 8,574-8,614 ft. The well was drilled to a total depth of 9,223 ft. in the Mississippian, and plugged back to 8,672 ft. A small amount of gas was recovered from perforations at 8,846-86 ft. in the Morrow, but production was not commercial. On the basis of this success, Sinclair has made location for another outpost, the 10 Charles Lips, 1 mile to the southeast in Section 2, Block 1, BBB&C Survey, Roberts County.

Baash-Ross News

BAASH-ROSS TOOL COMPANY • LOS ANGELES • HOUSTON • OKLAHOMA CITY • NEW YORK

OUR 32nd YEAR

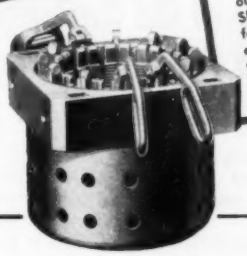
Why not run your casing with the same simplicity, speed and convenience as you do drill pipe?

Here's how... with the BAASH-ROSS SPLIT ROTARY TABLE CASING BUSHING

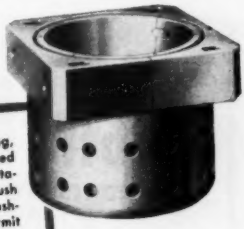
Did you know that you can run casing jobs with the same ease, convenience and simplicity with which you run your drill pipe? All that you need is a Baash-Ross Split Rotary Table Casing Bushing which replaces the regular master bushings in the rotary table and permits casing to be run *through the table* with the crew working at the same convenient height and in the same efficient manner as when handling drill pipe. Here's all you do...

1 Simply lift out the regular master bushings, drop in the Split Casing Bushing and lock the table. The Split Casing Bushing is thus solidly supported and properly centered over the hole so that you can run casing with the same ease and with the crew working at the same convenient height as when running drill pipe.

2 For large diameter casing, the larger sizes of Baash-Ross Type "UC" Casing Slips can be seated directly in the bore of the Split Bushing. As outlined below, "UC" Casing Slips insure a uniform full-circumferential grip on the casing that eliminates risk of damaging the thin casing walls through concentration of slip pressure.



3 For smaller sizes of casing, drop in a split and hinged Slip Adapter which is tapered on both sides and sets flush with the top of the Casing Bushing. Removable handles permit quick and convenient insertion of the split and hinged Slip Adapter.

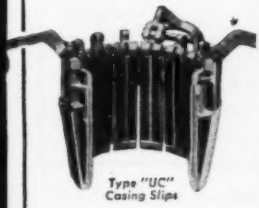


Handles Wide Range of Casing Sizes

Rotary Bore	Maximum Casing Size
27½" Dia.	21½" API
24½" Dia.	18⅝" API
20½" Dia.	16" API
17½" Dia.	13⅜" API

Modern rotary tables are able to support even the longest and heaviest casing strings with ample safety, and the Split Rotary Table Casing Bushing is ruggedly built to withstand the same service. Yet it is light in weight and readily portable in small tool cars.

The maximum casing size handled by the Casing Bushing is determined by the diameter of the opening through the rotary table. The accompanying chart shows the largest casing size that will pass through the Casing Bushings made for various size rotaries.

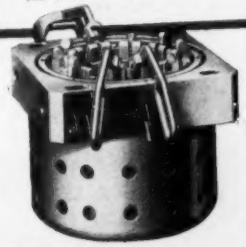


Type "UC" Casing Slips

Type "UC" Casing Slips Insure Maximum Safety in Modern Casing Operations

Baash-Ross "UC" Casing Slips are the most modern advancement in slips for handling casing strings. Because they consist of many narrow slip segments flexibly linked together, they *w-r-a-p* around the casing for a uniform, full-circumferential grip, thus insuring greater safety and maximum gripping efficiency on the relatively thin walls of casing strings. Their easily-renewable liners provide long life and low maintenance, and they have many other unique features. For more details see page 276 of the 1947 Composite Catalog.

4 With the Slip Adapter in place, Baash-Ross Type "UC" Casing Slips to fit smaller sizes of casing can be set directly into the tapered bore of the Slip Adapter, thus permitting a wide range of casing jobs to be run with equal efficiency.



Baash-Ross Split Casing Bushings are available domestically through leading supply stores.

For export orders write direct to Baash-Ross Tool Co., 11 W. 42nd Street, New York, N. Y.

Testing of oil and gas shows in Bridwell 1 Houghton, Hartley County wildcat, revealed only small amounts of oil, and the well was abandoned at a plug-back total depth of 3,884 ft. in lime. Perforations at 3,844-66 ft. were treated with 1,500 gal. of acid, but no shows of oil or gas were logged. After tubing was pulled, fluid rose 1,000 ft. in the hole, and bail tests recovered 5 gal. of salt water and 2 gal. of live oil per hour for 38 hours. No increase in fluid was noted when the hole was bailed dry. Total depth of the well was 4,464 ft. in granite.

In Gray County, Phillips has spudded two 10,000-ft. wildcats 1½ miles northwest of its 1 Hobart Ranch wildcat, which has had numerous good oil and gas shows while drilling both shallow and deep formations. The Gordon tests were spudded with cable tools in order to hold expiring leases. However, rotary tools are to be used in drilling operations after completion of the Hobart Ranch test.

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Complete in one unit. Quick and easy installation. Checks correct operating speed. For all internal combustion engines.

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TEXAS PANHANDLE (DISTRICT 10) WILDCAT FAILURES

Armstrong County: Hassie Hunt 1 J. A. Cattle Co., 125-G5-D&P, dry, TD 7,012 ft., pre-Cambrian 6,930 ft.

Childress County: Sinclair Oil & Gas Co. 1 W. Mullins, 724-H-W&NW, dry, TD 7,953 ft., elev. 1,914 ft., Wolfcamp 2,770 ft., Pennsylvanian shale 4,145 ft., lime 4,828 ft., Strawn 5,840 ft., Bend 6,690 ft., Chester 7,015 ft., Meramec 7,220 ft., Osage 7,436 ft.

Donley County: Placid Oil Co. 1 Kelly, 47-G7-A&G, dry, TD 7,059 ft., elev. 2,520 ft.

SOUTHEASTERN NEW MEXICO

The Texas Co. 1-AU State, 29-14s-32e, was running casing for completion as a Wolfcamp discovery. The well tested water in the Devonian and was plugged back. Location is about 2 miles north of the same company's 1-AR State, recent Wolfcamp discovery.

Phillips Petroleum Co. 1-A Pello, wildcat in 12-15s-32e, unloaded 3,476 ft. of clean 37°-gravity oil after a drill-stem test in the upper Wolfcamp at 9,504-32 ft. There was oil and gas-cut mud in the bottom stands with no water. It was drilling ahead on a 10,000-ft. contract.

Los Neitos Oil Co. 1 Elliott-Federal, 27-11s-38e, had a fishing job at 12,218 ft., total depth. Drill-stem test in the Devonian at 10,193-10,218 ft. recovered 200 ft. of mud with no shows.

Magnolia Petroleum Co. 1 Black, 9-15s-36e, was swabbing load oil and acid residue after treating the Pennsylvanian through perforations at 11,440-58 ft.

Skelly Oil Co. 9-O State, wildcat in 31-16s-37e, developed 100 ft. of slightly oil and gas-cut mud on a 3-hour test at 7,800-7,990 ft.

SOUTHEAST NEW MEXICO SUCCESSFUL WILDCAT

Eddy County: Leonard Oil Co. 1 State, 21-17s-29e, TD 4,028 ft., pay 2,246-52 ft., 1,500,000 cu. ft. of gas.

Eastern Texas

Pure Locates Confirmation To Freestone County Strike

DALLAS.—Pure Oil Co. has announced location for a second Freestone County exploratory test, which will attempt to confirm the same firm's 1 Rufus Howard, gas-distillate discovery in both the Pettit and Travis Peak zones.

The new location will be 1 J. A. Wright, about 1¼ miles southwest of the discovery in Isaac Holman Survey, northwest of Teague.

The discovery, 1 Howard, is still testing. At last report the well flowed 1,400,000 cu. ft. of gas a day from Travis Peak perforations between 7,600-7,700 ft. Testing was under way in the Pettit, which produced 5,000,000 cu. ft. of day a day on ⅝-in. choke plus 10 gal. of distillate an hour from perforations at 7,213-7,384 ft.

Another Freestone wildcat, Humble Oil & Refining Co. 1 Fred Marberry northeast of Kirvin, was running casing. Total depth was 8,325 ft. in sand.

Northwest of Marquez, Humble 1 Jewel Martin was drilling below 9,091 ft. Humble 1 Watson, A. Nelms Survey, was drilling sand and shale at 8,158 ft. No shows had been reported for either well.

R. L. Peveto and D. S. Hager 1 Moore, Hunt wildcat 1 mile southwest of Campbell was reported dry at 3,266 ft., after coring through the Woodbine.

Humble announced location for its 1-H Pickering Lumber Co., a 7,000-ft. test to be drilled in Joseph Brigham Survey on a block which the company has held for several years. Nearest production to the drill site is 3½ miles northwest in Patroon field.

R. E. Smith, Houston, was reported ready to start operations at 1 J. L. Allgood, a projected 9,000-ft. test 2 miles east of Lanier

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in Cass County in the Curtis Jurnigan Survey, A-568. Contract depth is expected to explore the Cotton Valley.

EAST TEXAS (DISTRICTS 5 AND 6) WILDCAT FAILURES

Fannin County: Henderson Drilling Co. 1 J. C. Parks, Wm. O'Brien Sur., dry, TD 1,538 ft.

Smith County: Calto Oil Co. 1 A. S. Genecov, R. L. Howell Sur., dry, TD 5,095 ft.

Jerome McLester 1 W. W. Butler, I. Croom Sur., dry, TD 4,300 ft., elev. 356 ft., Woodbine 4,230 ft.

Texas Gulf Coast

Grimes County's Potential Deep Discovery Sets Casing

HOUSTON.—Gulf Oil Corp. has set 5½-in. casing to 10,521 ft. in its Grimes County wildcat, 1 William Gardner. This prospective field opener is bottomed at 10,723 ft., and electric log has been run to total depth. Drill site is in James Darwin Survey, Abstract 117.

Danbury Dome, Brazoria County, has been extended on the southwest flank at Midstates Oil Corp. 1 August Zgarbe. The well was completed in the F-1 and F-3 zones of the Frio at 9,180-92 ft., 9,242-60 ft., and 9,280-9,310 ft. The lower section had shut-in pressure of 3,400 psi., and flowing pressure of 2,775 psi. The well is producing gas-distillate, and operator is moving in equipment to test volume.

After coring to total depth of 8,575 ft., Sohio Petroleum Co. has plugged 1 Kirby Lumber Co., wildcat test in Hugh Means Survey, Liberty County. No commercial shows were reported in the venture.

Anderson-Prichard Oil Corp. is extending production on the southwest flank of Gohlke-Fordtran field, DeWitt County, at 1 Albina Bialek. On drill-stem test at 8,204-50 ft., through ¼-in. chokes, recovery was water cushion, slightly oil and gas-cut, and 120 ft. of rathole mud heavily cut with gas and oil.

R. S. Randerson has extended production on the southwest flank of Holzmark field, Bee County, at 1 Ella Martin, located approximately 3,300 ft. southwest of gas production in the field. From open hole at 3,520-56 ft., the well was completed for an estimated 30 to 40 bbl. of oil daily.

Old Ocean field has been extended on the Matagorda County side at Paul Barnhart and B.B.M. Drilling Co. 2 M. G. Johnson, F. George Survey. The 2,030 ft. northwest outpost recovered large volumes of oil on four drill-stem tests conducted at 10,039-41 ft., 10,040-42 ft., 10,041-63 ft., and 10,063-73 ft.

TEXAS GULF COAST (DISTRICTS 2 AND 3) SUCCESSFUL WILDCATS

Colorado County: New pay at Hamel—Rex Cauble 1 J. F. Walker, J. E. Smith Sur., A-503, TD 10,428 ft., Wilcox 6,670-80 ft., IP: 42 bbl. oil per day, ¼-in. choke, 38° gravity.

Grimes County: Oil discovery—Woodley Petroleum Co., Stanolind Oil & Gas Co. 1 Iris Clark, et al, Wesley Fisher Sur., A-201, TD 8,198 ft., perf. 4,688-92 ft., IP: 21 bbl. oil per day, 12/64-in. choke, 35° gravity, TP 1,550 psi.

Harris County: Amerada Petroleum Corp. 1 Linda F. West, Thomas Hogan Sur., A-326, Lot 9, TD 7,922 ft., perf. 7,495-7,500 ft., IP: 85 bbl. oil per day, 36.4° gravity.

TEXAS GULF COAST (DISTRICTS 2 AND 3) WILDCAT FAILURES

Calhoun County: Ryan, Hays & Burke 1 Beatrice Roemer Franklin, E. Farrias Sur., dry, TD 9,559 ft.

DeWitt County: Henshaw Bros., J. R. Howe & S. H. Henry 1 Anglo Fanelli, Jr., John T. Tinsley Sur., A-455, dry, TD 7,516 ft.

Fayette County: C. G. Glasscock 1 R. H. Mattingly, Jessee Bartlett League, dry, TD 3,800 ft.

Hamman Oil & Refining Co. 2 Joseph Tupa et al John Vivien ⅓ League, dry, TD 2,462 ft.

Goliad County: Boyce-Smiser-Runion 1 Otto Franz, E. J. Armstrong Sur., A-53, dry, TD 4,350 ft.

Jackson County: Youngblood Well Service 1 Mrs. W. L. Jackson et al, S. C. A. Rogers League, A-65, dry, TD 4,625 ft.

Karnes County: George & Wrather Oil Co. & Tom Vessels, Jr., 1 W. J. Porter et al, Ramon Musquiz & V. Blanco Sur., dry, TD 7,515 ft.

Refugio County: Rock Hill Oil Co. & Phillips Petroleum Co. 1 A. D. Rooke et al, Anastacio Reojao Sur., A-59, dry, TD 7,500 ft.

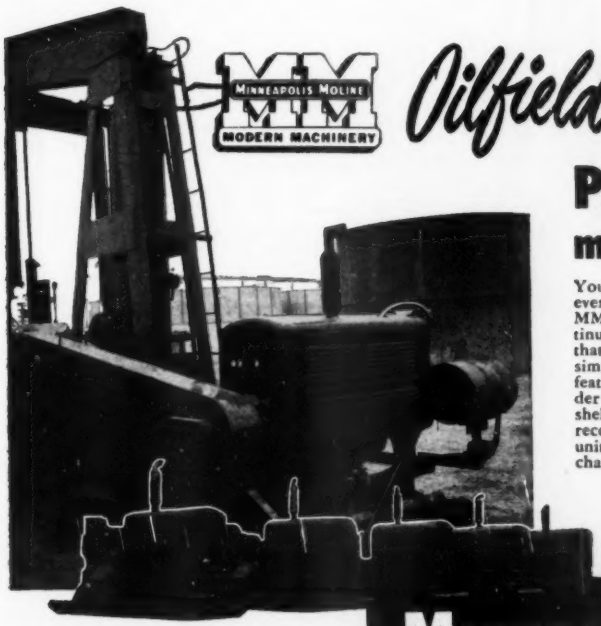
Victoria County: Arnold O. Morgan 1 J. B. Shiller, M. A. Castanon Sur., A-146, dry, TD 7,000 ft.

Wharton County: R. B. Mitchell 1 H. C. Cockburn, S. A. Larche Sur., A-268, dry, TD 7,700 ft.

Mississippi

Monroe County Discovery Tests 16,160 M.c.f. of Gas

JACKSON.—Mississippi's important gas discovery in the Paleozoic area of the state, Malcolm N. McCaskill 1 J. T. Sanders, 22-15s-6e, has been gaged for 16,160,000 cu. ft. of gas per day with 1,141-psi. flowing pressure. Flow was gaged through ¾-in. choke. This is a greater volume and pressure than had been estimated by many who



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observed the flow. There is still no positive evidence that will prove from what horizon the gas is being produced. This well, located in Monroe County, blew out making gas while operator was cleaning out an old well drilled by Carter Oil Co.

On the west side of Tinsley field, Yazoo County, testing operations are under way at Union Producing Co.-Jones-O'Brien 1 Logan, 23-10n-3w, Smackover wildcat. Operators have encountered considerable difficulty with leaks in tubing and packers. Tubing has now been rerun, and the well is flowing an unesimated amount of sour gas through ¼-in. choke with 900 psi. tubing pressure. This well is bottomed at 14,427 ft. in the third sidetracked hole.

In Wilkinson County, approximately 3½ miles west and slightly south of the one-well Freewoods field, Max B. Andrea-L. Cashion Co. 1 T. B. & Henry Hazlip et al, 10-4n-1e, was dry at total depth of 7,260 ft. A slight amount of oil was recovered from perforations in the Wilcox at 6,456-57½ ft. Another test at 6,369½-70½ ft. recovered 8 stands of mud and salt water cut approximately 10 to 15 per cent with oil.

In Mobile Bay, Alabama, Gulf Refining Co. is drilling below 8,763 ft. in its wildcat, 1 State of Alabama "D."

MISSISSIPPI WILDCAT FAILURES

Adams County: John S. Callen 1 J. J. Newman Lumber Co. et al, 64-6n-1w, dry, TD 6,797 ft.

B. Serio 1 Leslie Kaiser, 19-7n-1w, dry, TD 6,500 ft.

Amite County: Sun Oil Co. 1 R. E. Tynes, 18-4n-4e, dry, TD 8,013 ft.

Claiborne County: R. M. Harris-L. Cashion Co. 1 C. L. Nelson, 9-12n-3e, dry, TD 6,014 ft.

Greene County: I. P. LaRue, Jr., 1 U. S. A., 8-5n-7w, dry, TD 8,510 ft.

Hancock County: Sun Oil Co. 1 Whitefield-Weston Unit, 22-7s-16w, dry, TD 9,900 ft.

Rocky Mountain

Uintah County Wildcat Gets Good Mesa Verde Oil Show

DENVER.—Carter Oil Co. has made an important drill-stem test for the Uinta basin in its Willow Creek, Uintah County, wildcat. The well is 1 Unit, C NE SW 21-11s-21e, south of previous discoveries in the basal Green River formation.

On drill-stem test 8,176-95 ft., tool open 4 hours, there was gas at the surface in 18 minutes with a recovery of 270 ft. of free oil and 180 ft. of heavily oil-cut mud. The oil is 40.9° gravity, light green in color.

This well had been considered a failure since no important shows were logged in the basal Green River. However, Carter continued drilling as a part of the company's extensive exploratory program in this basin.

At the present depth the well is some 1,800 ft. in the Mesa Verde formation. The wildcat is approximately 40 miles northwest of a gas discovery completed in Mesa Verde earlier this year by Roy Johnson, of Ardmore, Okla., and others in the Hells Hole area, Rio Blanco County, Colorado. The Johnson well was rated capable of producing at the rate of 8,000,000 cu. ft. of gas daily and is now shut in. There has been no previous Mesa Verde production in this part of the Rocky Mountains, although a few wells in central Wyoming have found oil from that formation. The San Juan basin has a number of wells producing gas from Mesa Verde sands.

In southeastern Utah, Shell Oil Co. is continuing tests at 1 Unit, NW NW NE 32-39s-23e, wildcat at Bluff Unit, San Juan County. The well is now reported flowing 4,000,000 cu. ft. of carbon dioxide gas daily with a spray of distillate. Shell perforated the zone 7,520-36 ft. after plugging back from 8,762 ft., total depth, in pre-Cambrian. The well had several shows on drill-stem tests through the Mississippian when that formation was drilled, and cemented casing at 7,680 ft. for additional testing. This wildcat is of considerable importance in a general area where there has been little drilling. Outcome may decide future drilling for a large part of the San Juan basin.

The Williston basin of Montana and North Dakota continues to be the most active and interesting from a wildcat standpoint in the Rocky Mountain region. Carter Oil Co. is now nearing the Charles pay zone, found at East Poplar by C. H. Murphy, Jr., at the West Poplar wildcat. The well is 1 West Poplar, C NW SW 18-29n-50e, now coring below 5,822 ft. Kibbey was reported at 5,354 ft., and Charles is expected within the next 25 ft. in the well. The Murphy wildcat, 8 miles southeast, flowed oil on tests of the Charles and is now coring below 5,880 ft. with no information released on the well.

Shell Oil Co. is testing two northeastern Montana wildcats, the Richey area well in northern Dawson County, which flowed on tests of the Charles, and the Pine Unit well in Wibaux County, which showed oil in Ordovician. At Pine Unit, SW SW NE 30-12n-57e, Shell has acidized with 1,500 gal. and swabbed 112 bbl. of oil, 29° gravity, in 12½ hours from the zone.

The Texas Co.'s wildcat at Cedar Creek, between the Pine Unit and Richey area wells, is now at 9,079 ft., after recovering oil on tests of 200 ft. of Ordovician section. The operator is running log and may run casing at the present depth. In North Dakota Amerada Petroleum Corp. continues drilling and testing on wildcats along the long Nelson anticline through Williams and McKenzie counties.

There were 17 wildcat completions in the Rocky Mountains with two oil discoveries and one gas discovery during the week. Seaboard Oil Co.'s Whistle Creek discovery flowed 255 bbl. of oil in 18 hours from Tensleep, and the company has started a development-drilling program through this area of Wyoming. Olds Oil Co. made a small pumping completion in the East Dalton area, Nebraska. In Utah, Byrd-Frost, Inc., tested its gas discovery at Clear Creek at the rate of 10,000,000 cu. ft. daily.

WYOMING WILDCAT SUCCESS

Park County, Whistle Creek area: Seaboard Oil Co. 1 State Unit, NE NW SW 16-56n-98w; TD 5,825 ft.; IP: flowed 255 bbl. oil in 18 hr., Virgelle 1,228 ft., Frontier 2,695 ft., So. Byron 2,855 rt., Torchlight 2,940 ft., Peay 3,188 ft., Mowry 3,300 ft., Muddy 3,862 ft., Dakota 4,100 ft., Dakota sand 4,175 ft., Fuson 4,234 ft., Morrison 4,270 ft., Morrison sand 4,386 ft., Sundance 4,678 ft., Gypsum Springs 5,085 ft., Massive Anhydrite 5,165 ft., Chugwater 5,203 ft., Dinwoody 5,700 ft., Phosphoria 5,726 ft., Tensleep 5,795 ft.

MONTANA WILDCAT FAILURES

Hill County: Union Oil Co. of California 1 Freeman, C SW 23-34n-8w; TD 2,356 ft.; dry.

Pondera County, Marias River Nose area: The Texas Co. 1 F. M. Watson, SE NW NE 14-31n-5w; TD 2,940 ft.; dry; Kootenia 2,150 ft., Ellis 2,695 ft., Madison 2,937 ft.

Rosebud County, Injun Creek area: Amerada Petroleum Corp. 1 Hugen, CW½ NW SW 17-9n-32e; TD 6,575 ft.; dry; Claggett 2,110 ft., Eagle 2,490 ft., Mosby 3,650 ft., first Cat Creek 4,729 ft., Kootenai 4,830 ft., third Cat Creek 5,020 ft., Morrison 5,080 ft., Ellis 5,310 ft., Reardon 5,452 ft., Piper 5,638 ft., Piper sand 5,748 ft., Amsden 5,752 ft., Kibbey 6,344 ft., Charles 6,529 ft.

Toole County, North Cut Bank area: Union Oil Co. 1 State 429, SE SE SW 16-37n-4w; TD 2,575 ft.; dry; Kootenai 2,100 ft., Moulton 2,485 ft.,

Yellowstone County, Laurel area: Billings Oil & Development Co. 1 Shay, N½ NE NW 13-2s-23e; TD 2,400 ft., shut down; Lakota 2,180 ft., Morrison 2,215 ft.

Yellowstone County, Mosser field: Shelbourne Oil Co. & R. M. Amick 1 Kelly, SE SW NW 26-3s-24e; TD 1,054 ft.; PB

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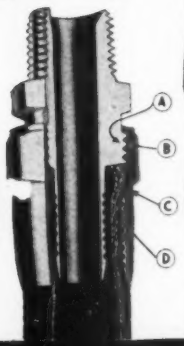

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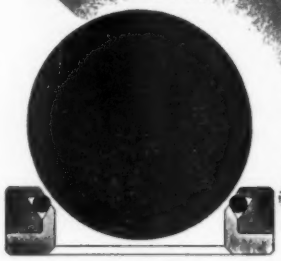

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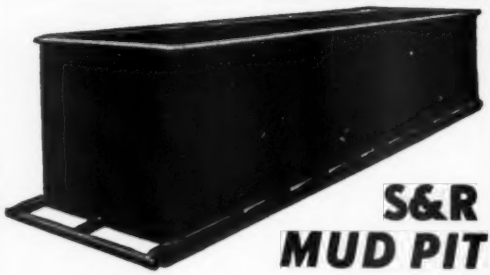

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Sweetgrass County: Cities Service Oil Co. 1 Cremer, C SE NE 17-4n-17e; TD 7,695 ft.; dry; Judith River 1,015 ft., Claggett 1,490 ft., Eagle 2,197 ft., Colorado 2,700 ft., Frontier 3,685 ft., Muddy 4,377 ft., first Cat Creek 4,610 ft., Kootenai 4,690 ft., third Cat Creek 4,880 ft., Morrison shale 4,965 ft., Morrison sand 5,038 ft., Ellis 5,228 ft., Amsden 5,494 ft., Charles 5,755 ft., Madison 6,393 ft., Devonian 7,040 ft., Ordovician (?) 7,492 ft., Cambrian 7,663 ft.

L. W. Winkler & Sons 1 Cain, C NE SW 23-2s-17e; TD 5,020 ft.; dry; Judith River 1,380 ft., Eagle 2,550 ft., Colorado 3,100 ft., Frontier 4,620 ft.

UTAH WILDCAT SUCCESS

Carbon County, Clear Creek area: Byrd-Frost, Inc., 1 Utah Fuel Co., NW SW SE 5-14s-7e (SLM); TD 4,761 ft.; IP: flowed 10,000 M.c.f. gas; PB TD 4,711 ft., Masuk 470 ft., Emery 850 ft., Bluegate 2,450 ft., Ferron 4,340 ft.

WESTERN NEBRASKA WILDCAT SUCCESS

Cheyenne County: Olds Oil Co., General Production Co. 1 Laing, SW SW NE 32-17n-49w; TD 4,729 ft., IP: pumped 71 bbl. oil per day. Niobrara 3,732 ft., Ft. Hays 3,976 ft., Codell 4,062 ft., Carlile 4,098 ft., Greenhorn 4,266 ft., first sand 4,529 ft., Muddy 4,641 ft., "J" sand 4,684 ft., Skull Creek 4,718 ft.

WESTERN NEBRASKA WILDCAT FAILURES

Banner County, Northeast Harrisburg area: H & H Drilling Co. 2 Grant, C SE NW 30-19n-55w; TD 5,947 ft.; dry. Niobrara 4,932 ft., Ft. Hays 5,146 ft., Codell 5,248 ft., Greenhorn 5,419 ft., first sand 5,773 ft., Muddy 5,906 ft.

Cheyenne County: S. D. Johnson 1-X Bolie, SW SW NW 27-16n-50w; TD 4,918 ft.; dry. Niobrara 3,939 ft., Ft. Hays 4,205 ft., Codell 4,312 ft., Greenhorn 4,463 ft., first sand 4,747 ft., Muddy 4,848 ft.

A. L. Duff 1 Hopkins, SE SE SW 21-15n-51w; TD 5,223 ft.; dry; Niobrara 4,172 ft., Ft. Hays 4,450 ft., Codell 4,547 ft., Greenhorn 4,710 ft., "D" sand 4,975 ft., "G" sand 5,012 ft., "J" sand 5,120 ft.

Kimball County: Becker & Sloss 1 John L. Roberts, NW NW NW 15-14n-54w; TD 6,470 ft.; dry. Niobrara 5,012 ft., Ft. Hays 5,256 ft., Codell 5,372 ft., "D" sand 5,865 ft., "J" sand 6,008 ft., "M" sand 6,224 ft.

J. C. Wynne et al 1 Cederberg, C NE SW 22-14n-56w; TD 6,752 ft.; dry. Niobrara 5,670 ft., Codell 5,960 ft., Greenhorn 6,160 ft., first sand 6,480 ft., Muddy 6,622 ft., Skull Creek 6,690 ft.

Southwest Texas

Starr County Test Recovers 135 Ft. Oil on Drill Stem

CORPUS CHRISTI. — George & Wrather Oil Co. & Bass-Vessels have recovered oil on drill-stem test in 1 Hilaria A. De Garza, wildcat 2 miles north of LaReforma field in Starr County. On 20-minute test of interval 5,942-51 ft., recovery was 135 ft. of oil and 30 ft. of oil-cut mud. Working pressure was 40 psi. at the surface, and bottom-hole flowing pressure was 330 psi. Operators are drilling below 6,268 ft.

A deep Cameron County wildcat, C. G. Glasscock 1 Mellie Esperson Estate, is drilling at approximately 14,000 ft., and operator will run log to that depth. A mud logger picked up some possible shows around 13,700 ft., and pipe may be set to test this interval.

Meanwhile, Magnolia Petroleum Co. 1 Grace Doughty, deep Hidalgo County wildcat, was dry at 15,003 ft. Operator set 7-in. pipe to 12,590 ft. and plugged back to 12,485 ft. Hydrafrac process was applied to perforations at 12,324-41 ft., 12,346-58 ft., and 12,366-78 ft. The well cleaned into pits for 18 hours flowing small amount of mud. Perforations 10,530-50 ft. tested dry with no pressure and no recovery. This duster is located in San Salvador del Tule Grant, Tract 90.

Another South Texas wildcat is drilling below 13,509 ft. in search of the Wilcox. Test is Hiawatha Oil & Gas Co. B-1 George Parr, in Benavides field, Duval County.

Five miles southwest of Cuellar field production in Zapata County, The Texas Co. has run production string in 1 Fernando Cuellar et al. Hole is bottomed at 7,366 ft. On drill-stem test at 3,842-60 ft., recovery was 15 ft. of rathole mud. Working pressure at the surface was 9.5 psi., and bottom-hole flowing pressure 20 to 50 psi. Another test at 3,878-3,916 ft. recovered 30 ft. of gas-cut mud and 600 ft. of salt water. A shallow test made at 1,402-07 ft. had slight show of oil. Well is located in E. & F. Cuellar Survey, Abstract 208.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) SUCCESSFUL WILDCATS

Archer County: Oil discovery—C. G. Glasscock & Pontiac Refining Co. 1 State Tract 48, Copano Bay, TD 8,194 ft., perf. 6,295-300 ft., IP: 140 bbl. oil per day, 40.5° gravity, TP 1,310 psi., ¼-in. choke.

San Patricio County: Gas discovery—Plymouth Oil Co. F-8 E. H. Welder, Sec. 31, Welder Ranch Subd., TD 7,420 ft., perf. 3,638-40 ft., IP: 622,000 cu. ft. of gas per per day, 9/64-in. choke, TP 1,400 psi.

Wilson County: New pay at Borregas Creek—Martin, Shelly, Thomas & Wise 2 J. C. McCabe & Olmos, Rafael Salinas Sur. 343, TD 6,004 ft., Austin chalk 5,700-38 ft., IP: 438 bbl. oil per day, ½-in. choke, 22.8° gravity.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) WILDCAT FAILURES

Aransas County: Anderson-Prichard 1 F. J.

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Bastrop County: F. R. Jackson 1 Price, E. W. Barton Sur., 4 mi. S of Bastrop, dry, TD 6,426 ft.

Brooks County: Howeth & Mason 3 Anna G. Bull, GC&SF Sur. 313, dry, TD 5,024 ft.

Carnes W. Weaver 1 Mary M. Lasater, G. Chapa Sur., A-98, dry, TD 7,403 ft.

Duval County: Jake L. Hamon, Edwin L. Cox & Geo. H. Coates D-4 Clara Driscoll "D," Santa Rosalia Grant, Sweeden Farm Lots Subd., Sec. 70, dry, TD 2,810 ft.

Lundell Bros. 11 E. C. Lundell, Sec. 364, J. Poitevent Sur., dry, TD 1,890 ft.

Frio County: A. A. Davis 1 Otto J. Doman, Sur. SF 15024, 14 mi. SW of Charlotte, dry, TD 1,008 ft.

Hidalgo County: Magnolia Petroleum Co. 1 Grace Doughty, San Salvador de Tule Grant, dry, TD 15,003 ft.

Jim Wells County: W. Earl Rowe et al B-1 R. V. Embleton, La Tinaja de Lara Grant, dry, TD 3,432 ft.

W. Earl Rowe et al 1 Leonor Perez, L. Tinaja de Lara Grant, Share 3, dry, TD 4,830 ft.

Kimble County: The Superior Oil Co. 1 M. J. Dubrin 369, Keelan Taylor Sur. 369, dry, TD 2,390 ft.

LaSalle County: A. P. Simmons 2 O. S. Petty, Atascosa County School Land Sur., A-704, dry, TD 4,822 ft.

San Patricio County: K. D. Owen et al 2 D. O. Crumpton, San Patricio County School Land Sub. 2, Sec. 69, dry, TD 9,610 ft.

Quintana Petroleum Corp. B-1 Bankers Mortgage, R. M. Williamson Sur., Block 81, Lot 3, dry, TD 9,292 ft.

South Louisiana

Deeper Woodlawn Field Oil Pay May Be Established

NEW ORLEANS.—An important ½-mile south extension has been made to Woodlawn field, Jefferson Davis Parish, at Union Sulphur & Oil Corp. 1 W. E. Walker et al. From perforations at 10,570-80 ft., the well was potentialed for 194 bbl. of 44.8°-gravity oil daily through 8/64-in. choke. The well is producing from a deeper sand than is flowing in the nearest producing wells, and indications are that the operator may have uncovered a new oil pay for the area.

Hunt Oil Co. is drilling below 4,250 ft. at 1 Ellis Reynaud, new 8,000-ft. wildcat in 7-3n-4e, Avoyelles Parish, approximately 1½ miles northeast of production in Marksville field.

Northeast of Marksville in C NW NE 33-3n-5e, Texas Pacific Coal & Oil Co. et al 1 C. H. Fisher was dry at total depth of 8,518 ft. in the Wilcox. Noncommercial show was logged in samples at 5,462-63 ft.

Humble Oil & Refining Co. plans to drill at 12,500-ft. wildcat in Assumption Parish. Venture is 1 Mrs. Kennie Kyle McKerall et al, 27-13s-13e, east of Lake Verrett.

In Lafourche Parish, Callery & Hurt have set 5½-in. casing at 13,130 ft. in 1 Caldwell Sugars, 19-14s-16e, wildcat north of Thibodaux. It is presumed that operator will start production tests immediately. The venture is bottomed at 13,858 ft. It had an original projected depth at 12,500 ft. Electric logs were run at 11,957 ft., 12,510 ft., and 13,602 ft.

After drilling to total depth of 10,649 ft. with no commercial shows encountered, The California Co. has plugged 1 Grand Prairie Levee District 4-State Lease 1785 Unit 1, wildcat in North Coquille Bay, Plaquemines Parish. Electrical surveys were run at 3,037 ft., 9,000 ft., 9,963 ft., 10,500 ft., and total depth.

Richardson & Bass, Inc., is coring below 12,250 ft. in 1 Shell-Luma Darbonne, wildcat in 19-5s-3w, Allen Parish. On drill-stem test, tool open for 12 hours, the well flowed an ungaged amount of oil for 3 hours before flow went to salt water. Maximum working pressure was 2,400 psi. The well has a projected depth of 13,000 ft.

SOUTH LOUISIANA WILDCAT FAILURES

Avoyelles Parish: Placid Oil Co. 1 H. M. Hanner, 23-2n-5e, dry, TD 9,506 ft.

Acadia Parish: Bates & Cornell 1 Edward Martin, 4-8s-2w, dry, TD 9,867 ft.

Plaquemines Parish: Estate of William Helis 2 H. J. Harvey, 50-20s-30e, dry, TD 10,830 ft.

The Texas Co. 1 State Lease 1953-Block 22, Breton Sound, dry, TD 9,906 ft.

Terrebonne Parish: Humble Oil & Refining Co. 1 State Lease 1868, 20s-13e, dry, TD 14,988 ft.

Canadian Fields

Production Tests Started At Pine Lake Prospect

CALGARY.—Production testing has commenced at the D2 Devonian prospect in the Pine Lake area that was drilled by the team of Husky Oil & Refining, Ltd. and Phillips Petroleum Co. of Oklahoma. During pump runs the past 3 days, oil recovery was slightly less than one-third of the total fluid yielded, the balance being water and bottom sediment. Testing is being continued in an effort to determine the possibilities of commercial production at this light crude oil strike.

The well, Husky-Phillips-Pine Lake 1, in LSD 13, 14-35-25w4, gave its first oil encouragement in D2 during July, was carried down as a test of D3 prospects and then plugged back, set casing and started production tests. It is about 67 miles northeast of Calgary, 20 miles east of Innisfail and about the same distance southeast of Red Deer. The Big Valley Devonian oil field is around 24 miles to the east.

The hole was completed at 7,920 ft., plugged back, and D2 zone was perforated at 7,046-54 ft. Three 24-hour pump tests run gave the following results: November 20, 71 bbl. of fluid (28 per cent oil); November 21, 57 bbl. of fluid (27.2 per cent oil); and November 22, 65 bbl. of fluid (33 per cent oil).

Imperial Oil, Ltd., has made another natural gas discovery at its wildcat in the Lost Point Lake area of central Alberta. The new strike, Imperial-Lost Point Lake 16-17-57-23, in LSD 16, 17-57-23w4, found its gas during drill-stem tests in the Viking sand. The Viking was contacted at 2,452 ft., and initial drill-stem test in that horizon (from 2,439-57 ft.) gave a maximum natural gas flow rate of 2,420,000 cu. ft. daily plus a recovery of 280 ft. of mud in 20 minutes. A second test, from 2,452-75 ft., gave an immediate gas flow with a rate of 3,719,000 cu. ft. daily and 30-minute recovery of 60 ft. of mud. Coring is now proceeding below 2,501 ft.

A team of Calgary oil firms, headed by Roxboro Oils, Ltd., has indicated oil success in the Lower Cretaceous at an extension venture in the northwest area of Campbell. The venture is located on a half-section tract that was acquired under development agreement with Trans Empire Oils, Ltd., Phillips Oil Co., Ltd., and others.

During initial drill-stem test in the Cretaceous, the well, Roxboro-Trans Empire-Phillips 1, flowed natural gas and gave a recovery of clean crude oil. One test from 3,720-50 ft. gave a flow of natural gas to the surface in 14 minutes, with maximum rate of 225,000 cu. ft. daily. When pipe was pulled there was a recovery of 570 ft. of clean oil. A second test, in the third member of the Cretaceous sands, from 3,790-3,813 ft., gave up 1,700 ft. of salt water in 1 hour. The crew will drill ahead to around 3,860 ft., run production casing and then perforate opposite the oil pay zone for production.

This well, located in LSD 3, 31-54-25w4, is 1¾ miles north of Imperial-Sturgeon 1, Cretaceous oil strike, and 2¼ miles northwest of other Cretaceous oil wells at Campbell.

Amerada Petroleum Corp. has set string of production casing at is natural gas discovery well in the Sunnynook area of southern Alberta, and plans to test the Blairmore section that showed gas prior to reaching total depth. The well, Amerada-Crown H.F. 23-29, is located in LSD 6, 29-27-14w4, about 12 miles northwest of the Cessford area gas wells. It completed drilling at 3,779 ft., and string of casing has been set. During a 50-minute drill-stem test in the upper Blairmore, the well flowed gas to the surface in 5 minutes, at the rate of 1,500,000 cu. ft. daily. A recovery of 2,220 ft. of slightly oil-cut mud was also recovered during that test which was from 3,446-75 ft.

CANADIAN WILDCAT FAILURES

Mic Mac-Acheson 5-25, LSD 5, 25-52-26w4, TD 5,200 ft., dry.

Amerada-Stanolind-Crown NF 33-11, LSD 7, 11-26-14w4, TD 3,675 ft., dry.

Fortune 2, LSD 1, 12-69-1w5, TD 3,474 ft., dry.

Dome-Socony-Michichi 11-5, LSD 5, 11-30-19w4, TD 7,107 ft., dry.

Calvan-Sapphire-Endon 8-10, LSD 8, 10-7-8w4, TD 2,380 ft., dry.

Challenger-Chargrand-Gardner 1, LSD 15, 1-53-4w4, TD 1,880 ft., dry.

Long Island-Homestead-Gas Exploration 1, LSD 10, 22-57-22w4, TD 3,523 ft., dry.

Mundare 1, LSD 6, 20-53-16w4, TD 2,414 ft., dry.

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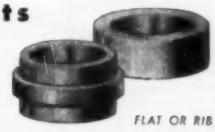

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Anglo-Calmont-C. & E.-Turin 2, LSD 7, 22-11-18w4, TD 3,789 ft., dry.
Bonanza-Wrentham 1, LSD 1, 22-6-17w4, TD 3,500 ft., dry.

North Central Texas

Nolan County Discovery Flows 9 Bbl. Oil Hourly

WICHITA FALLS.—Union Oil Co. 1 TXL, Nolan County prospect south of the Lake Trammel Canyon field, flowed an estimated 9 bbl. of oil an hour through ½-in. choke after treating perforations at 5,158-70 and 5,174-82 ft. The well kicked off after being swabbed. The flow was killed and peforations were to be made at 5,208-32 ft.

Seaboard Oil Co. 1-A Billie Hanks, 28-Z-T&P, southwest offset to the firm's Strawn discovery in southeast Nolan County named the Hylton-Strawn field, reported oil in the Canyon reef section. Drill-stem test from 4,487-4,509 ft. had flowing oil in 35 minutes at the rate of 191½ bbl. an hour. A hole full of oil was recovered in the pipe, plus some mud, and no water. Flowing pressure was 1,350 psi.

Second test from 4,509-34 ft. had oil in 2 hours and gaged from 10-15 bbl. of oil an hour during the last 45 minutes of the 3-hour test. Recovery in the pipe was 3,780 ft. of oil. Seaboard's first well had oil in the reef also but finished in the Strawn.

Sun Oil Co. has staked location for a 7,000-ft. wildcat 11 miles south of Sweetwater and 2 miles northeast of its discovery of Featherstone Strawn field. The new test will be the 3 Susie Featherstone in 37-X-T&P.

In Stonewall County, Seaboard 1 T. A. Upshaw, 61-D-H&TC, had flowing oil from the Canyon sand at 4,799-4,824 ft. Oil reached the surface in 70 minutes and made an estimated 10-15 bbl. an hour into pits. Drill pipe unloaded for 59 stands while coming out of the hole. Operators were running electrical surveys. Nearest production from the Canyon sand is 4½ miles south and east in Flowers field.

In Haskell County, Cities Service Oil Co. 1-85 Flat Top reported top of the conglomerate at 5,690 ft. A 45-minute test at 5,692-5,714 ft. developed only 60 ft. of drilling mud.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) SUCCESSFUL WILDCATS

Baylor County: J. J. Lynn 2 First National Bank of Bowie, Sec. 109, T&NO, TD 4,741 ft., Strawn pay 4,728 ft., flowed 116.6 bbl. 41°-gravity oil, 12/64-in. choke, TP 125 psi., GOR 850 cu. ft.

Callahan County: Sohio Petroleum Co., 1-A K. V. Dugan, Sec. 84, BBB&C Sur., TD 2,600 ft., elev. 1,875 ft., pay 1,692 ft., pumped 15.5 bbl. 39°-gravity oil.

Star Oil Co. 4-D Josie Brown, Sec 2, BBB-&C Sur., TD 1,561 ft., pay 1,550 ft., pumped 15 bbl. 39°-gravity oil.

Haskell County: Deep Rock Oil Corp. 1 Joe Jenkins, 289-45-H&TC, TD 4,936 ft., elev. 1,571 ft., perf. 4,828-4,900 ft., pumped 117.5 bbl. 40°-gravity oil, GOR 785 cu. ft.

Jack County: Cox Drilling Co. 1 Nora Lee Kee, Blk. 2, J. J. Waggoner Sur., TD 4,860 ft., elev. 1,175 ft., pay 2,255 ft., pumped 55 bbl. 40°-gravity oil, GOR 290 cu. ft.

O. P. Leonard 1 L. W. Fields, J. Balch Sur., A-41, TD 1,955 ft., gas sand 1,700-30 ft., 15,000 cu. ft. gas, TP 735 psi.

Lone Star Gas Producing Co. 1 Belle Alstot, J. Turner Sur., A-610, TD 5,656 ft., conglomerate pay 5,126-40 ft., 735,000 cu. ft. gas, ¼-in. choke, flowing pressure 1,874 psi.

Young County: Lebus Bros. 6-A W. L. Hawkins, Sec. 1,914, TE&L Sur., A-988, TD 2,765 ft., pay 2,741 ft., pumped 152 bbl. 41°-gravity oil.

J. H. Riddle 2 H. O. Prideaux, CTRR Sur., A-68, TD 662 ft., pay 653 ft., potential omitted.

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NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) WILDCAT FAILURES

Archer County: Fred B. Sharp 1 J. M. Black, Allison Armes Sur., A-5, dry, TD 1,209 ft.

Callahan County: Schkade Bros. Drilling Co. 1 J. L. Dugan, 7-D-SPRR, dry, TD 1,886 ft.

J. H. Wilson 1 B. R. Blankenship, Sec. 5, D&DAL Sur., dry, TD 2,178 ft.

Clay County: G. W. Cooper 1 J. P. Boddy, Swan & Stine Sur., A-941, dry, TD 5,613 ft.

Ted Norton 1 Stine, Blk. 16, Parker CSL, A-374, dry, TD 1,716 ft.

Coleman County: Naomi S. Grubb 1 Shirley Throgmorton, Coleman CSL 92, dry, TD 2,521 ft., elev. 1,450 ft., Caddo 2,470 ft.

Eastland County: Bankline Oil Co. 1 Reynolds White, 50-4-H&TC, dry, TD 3,810 ft.

Jack County: Henry Grace Drilling Co. 1-C Lindsey, I. N. Wright Sur., dry, TD 4,563 ft.

Jones County: Clark & Cowden 1 B. P. Davenport, 2-4-H&TC, dry, TD 2,541 ft., elev. 1,570 ft., Hope 2,100 ft.

Gulf Plains Corp. 1 D. L. Valiant, 100-1-BBB&C, dry, TD 4,107 ft., elev. 1,650 ft., King sand 2,924 ft., Swastika 2,995 tf.

Montague County: M. T. Flanagan and J. W. Modesett 1 J. L. Ivins, T. Leftwick Sur., dry, TD 2,194 ft.

A. D. McDuffie 1 R. C. Vannoy, Blk. 52, C. C. Hornsby Sur., dry, TD 2,100 ft.

B. F. Phillips 1 G. M. Davis, Blk. 71, Panola CSL, dry, TD 6,214 ft.

Nolan County: General Crude Oil Co. 1 J. T. Harmon, 25-Z-T&P, dry, TD 6,583 ft., elev. 2,226 ft., reef 4,606 ft., Ellenburger 6,515 ft.

Palo Pinto County: J. P. Logan 1 R. D. Hinkson, 71-3-T&P, dry, TD 4,360 ft.

Shackelford County: B. W. Fitzgerald 1 Nail Ranch, Sec. 154, ETRR, dry, TD 1,650 ft.

A. M. Howsley 1-42 Nail, Sec. 42, ETRR, dry, TD 1,141 ft.

Geo. A. Hughes, Jr. and H. W. Lee 1-A Morris est., Sec. 188, ETRR, dry, TD 1,740 ft.

Chas. C. Reed 1 W. C. Allen, Sec. 63, University Lands, dry, TD 625 ft.

Schkade Bros. 1 R. A. Elliott, Sec. 50, BAL Sur., dry, TD 1,448 ft.

Stephens County: E. J. Briback 1 Jackson est., 21-6-T&P, dry, TD 2,217 ft.

C. L. Echols 6 Langford, Sec. 122, HT³⁴B, dry, TD 2,075 ft.

Jackson-Herrell 2 J. D. Stanford, 66-6-T&P, dry, TD 2,001 ft.

W. W. Wise 1 W. G. Cockerell, Sec. 1,440, TE&L Sur., dry, TD 2,465 ft.

Stonewall County: Three Brothers Oil Co. 1 S. F. Turner, M. Cardova Sur., A-63, dry, TD 5,921 ft.

Miami Operating Co., Inc. 1 C. D. Wiley, 2-G-H&TC, dry, TD 6,315 ft., elev. 1,564 ft., Strawn 5,100 ft., Caddo 5,785 ft., conglomerate 5,934 ft.

Pan American Production Co. 1-B T. A. Jean, 9-U-T&P, dry, TD 6,504 ft., reef 5,096 ft., Ellenburger 6,100 ft.

Wichita County: E. B. Clark 1 J. P. Cunningham, 1-A164-H&GN, dry, TD 4,431 ft.

Wilbarger County: Baker Properties 1-B Waggoner, Geo. Butler Sur., A-3, dry, TD 2,435 ft.

Wise County: National Associated Petroleum Co. 1-A Flowers, W. S. Blount Sur., A-95, dry, TD 5,617 ft.

Young County: Wilbert Kunkel 1 Fay Clarke, TE&L Sur., Sec. 212, dry, TD 930 ft.

Kunkel 1 Hightower, Sec. 178, TE&L Sur., dry, TD 1,303 ft.

Larson & Smith 1 S. R. Jeffery, Sec. 469, TE&L Sur., dry, TD 275 ft.

McMahon - Bullington Drilling Co. 1 Wainescott, Sec. 285, TE&L Sur., dry, TD 3,615 ft.

McMahon-Bullington 1-A Wainescott, Sec. 285, TE&L Sur., dry, TO 524 ft.

Wesley Stephens 1 L. P. Moran, E. Robinson Sur., dry, TD 2,940 ft.

John H. Wilson 1 S. R. Jeffery, TE&L Sur., Sec. 52, dry, TD 942 ft.

Oklahoma

Beaver County Test Has Kansas City Lime Shows

PROMISING oil showings have been encountered in the Kansas City lime section by Flynn Oil Co. at its 1 School Land, a rank wildcat located in the SE SE SE 35-5n-23ecm, 8 miles northwest of Beaver, in Beaver County, Oklahoma Panhandle. Hole, however, is being deepened to the Morrow zone, its original objective, in the lower Pennsylvanian.

Top of the Kansas City was logged at 4,584 ft. A 60-minute drill-stem test at 4,771-82 ft. got a gas flow in 8 minutes and recovered 1,410 ft. of oil with 940 ft. of water. Gravity of the oil was 45°. Hole was deepened to 4,796 ft., where another test was made, taking in an interval below 4,788 ft. In the latter test, 330 ft. of oil and 120 ft. of water was recovered. The Morrow sand objective is expected around 6,250 ft.

Extension into Oklahoma of a recently opened pool in Cooke County, Texas, is indicated by showings encountered by Sinclair Oil & Gas Co. at its 1 Evans, NE SE SW 34-8s-2e, southeast of Marietta, in southern Love County. Showings were in the Hudspeth zone, in which a 55-minute drill-stem at 4,195-4,237 ft. got a gas flow in 2 minutes and recovered 1,125 ft. of oil with 1,320 ft. of oil and gas-cut water and 335 ft. of salt water. Gas flow was estimated at 5,000,000 cu. ft. per day. The discovery well, Sinclair 1 Murriel, of the new Cooke County pool, located a short distance south of the Love County line (Red River), produces from the Bruhlemeyer (Strawn zone) sand at 3,692-3,706 ft. The new Love County test found water in that pay. At latest report it was being deepened to possible lower pay zones.

Continental Oil Co.'s new Deese sand discovery well south of Cheek, in the same county, has been completed on the pump. It made 43 bbl. of oil during a 24-hour period. Gravity of the oil is 32.6°. Production is from casing perforations at 7,253-64 ft. and 7,302-22 ft. Hole had been drilled to 8,506 ft. The well is 1 Moxley. Location is in the SW SW SW 10-6s-1w.

A new Hunton lime producing area appears to have been discovered by S. C. Yingling at his 1 Kirk, SE NW NE 22-5n-4e, a mile north of the Bebee field, in Pontotoc County. Top of the Hunton was logged at 2,425 ft. A 60-minute drill-stem test of an interval at 2,475-2,546 ft. yielded 1,100 ft. of oil. Deepening, operator logged the top of the Viola at 2,648 ft., and at latest report hole was being drilled ahead below 2,825 ft.

Location for another deep wildcat test in Beckham County, in the extreme western part of the state, has been made by Ryan Oil Co. Location for the test, 1 Gordon, is in the C NW SE 20-10n-26w, about 4 miles west of Mayfield, in the northwest corner of the county. It is 7 miles southwest of Carter Oil Co.'s deep discovery well, 1 Garrett, completed recently in the Hoxbar conglomerate around 10,300 ft. Carter is down to the pay in its second well, 1 Atwood, SE NW NW 4-10n-25w, a diagonal southeast offset to 1 Garrett. Cores from 10,282 ft. to 10,322 ft. carried stains and odor and at latest report the operator was preparing to run a drill-stem test.

OKLAHOMA SUCCESSFUL WILDCATS

Lincoln County: Sinclair Oil & Gas 1 Tansel, NE NE SW 8-14n-2e, 40 bbl. oil from Checkerboard at 3,752-72 ft., TD 5,344 ft.

Logan County: O'Rourke-Baker Drilling 1 Wallace, SW SW SW 22-17n-1e, 136 bbl. oil from second Wilcox topped at 5,106 ft., TD 5,110 ft.

Major County: Superior Oil 21-14 Smithson, NE NW NW 15-22n-11w, 12 bbl. oil from Manning, TD 6,820 ft., extension to Ringwood.

Osage County: Lindsay 1 Osage, NE NE NE 6-23n-10e, 136 bbl. oil from Bartlesville at 2,168-72 ft., TD.

Stephens County: Shell Oil 1 Tugman, NE SW NE 11-2n-8w, 95 bbl. oil from Tugman sand at 6,072-85 ft. and Atkins sand at 7,570-91 ft., TD 10,006 ft.

OKLAHOMA WILDCAT FAILURES

Beaver County: Kingwood Oil 1 Davis, NE NE NE 16-3n-21ecm, dry, TD 7,388 ft.

Carter County: Continental 1 Pruitt, SE SW NE 23-3s-1e, dry, TD 4,254 ft.

Comanche County: Coline Oil 1 Sessums, C SW SW 25-4n-10w, dry, TD 14,153 ft.

Creek County: Smith & Cleary, Inc. 1 Darnell, NW NW NE 7-15n-9e, dry, TD 3,640 ft.

Garfield County: Deep Rock 1 Schnoithman, SW NW SE 25-23n-3w, dry, TD 5,136 ft.

Hughes County: Finston 1 Kirby, NW NW NE 28-8n-9e, dry, TD 3,670 ft.

Lincoln County: Flynn Oil 1 Hubbell, NE NE NW 30-13n-3e, dry, TD 4,840 ft.

Mid-Continent 279 School Land, NE NE SW 36-15n-4e, dry, TD 3,730 ft.

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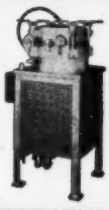

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An-Son 1 Ealey, SW SW NE 19-16n-3e, dry, TD 4,094 ft.
Warren Oil 1 Crane, SW NE SW 27-16n-4e, dry, TD 4,664 ft.
Major County: Superior Oil 27-18 Law, NE SW SW 18-22n-11w, dry, TD 7,000 ft.
Superior Oil 28-22 Schultz, SE SW SW 22-23n-10w, dry, TD 7,875 ft.
Noble County: Porter Oil & Gas 1 Springfield, SE SE NW 19-24n-3e, dry, TD 4,006 ft.
The Texas Co. 1 Thompson, NW SE SW 8-24n-4e, dry, TD 3,782 ft.
Okfuskee County: Gulf Oil 1 Steyr, NE SE NE 20-13n-9e, dry, TD 3,989 ft.
Oklahoma County: Sadler 1 Claudine, SE SE NE 31-11n-1e, dry, TD 6,560 ft.
Osage County: Republic Natural Gas 1 Osage, NW NE SE 21-25n-3e, dry, TD 2,800 ft.
Payne County: Clark & Cowden 1 Burdick, NE NE SW 26-18n-2e, dry, TD 4,870 ft.
Seminole County: Evans 1 Flynn, NE NW SE 24-10n-7e, dry, TD 3,693 ft.
Stephens County: Little 1 Clark, NW SE NW 31-1n-4w, dry, TD 8,550 ft.

California

Light Oil Strike Made In Playa Del Rey Area

LOS ANGELES.—A 7,400-ft. light-oil discovery was in the process of being completed 1 mile east of the old Play Del Rey field on the western edge of Los Angeles. On a formation test the wildcat, Bolsa Chica Oil Corp. 1 Kidson, yielded 24 bbl. of 33°-gravity crude and 7 bbl. of mixed fresh and salty water when the drill pipe was pulled. During the test, carried out at 7,381-7,418 ft., the well blew gas at a rate estimated between 1,000,000-2,000,000 cu. ft. daily.

Following the test, an effort was made to cement off the bottom of the hole with 28 sacks of cement but the plug did not hold. A string of 7-in. casing thus was cemented at 7,418 ft., or 47 ft. into the sand. Location of the potential discovery is in 22-2s-15w.

At West Newport field in Orange County, DeWitt Langford successfully completed a shallow fault-block pool opener. The well, 1 Oka, first was drilled to 5,296 ft. and then redrilled from 1,730 to 2,170 ft. It was completed through perforations at 2,015-59 ft., pumping 140 bbl. of oil of which 95 per cent was water. Continued pumping resulted in the cut being reduced to 60 per cent.

About ½ mile south of Union Oil Co.'s Sansinena field, Los Angeles County, R. E. Bering added a second producer in the La Habra Heights area. The 2 York, in SE SE 30-2s-10w, was completed at 3,346 ft. for 250 bbl. of 25°-gravity crude. At the 3 York the operator was running 9-in. casing in an effort to obtain production in an upper 2,000-ft. sand. The activity is being carried out at a multiple-well location.

In the San Joaquin Valley region and 1 mile east of Greeley field, Humble Oil & Refining Co.'s second extension attempt to its Rosedale discovery showed good possibilities. With hole bottomed at 5,936 ft. in the Stevens sand, a formation test at 5,897-5,912 ft. resulted in a recovery of 5,897 ft. of oil and gas after the tool had been open 1 hour. The extension, 1 August Prunotto, is located ¼ mile southeast of the discovery, both in Section 15-29s-26e. The company's first stepout, 1 Kern County Land about ¾ mile northeast of the discovery, was a failure.

At Winters gas field in Yolo County, Mohawk Petroleum Corp. apparently extended gas production about ⅔ mile north. A formation test at 4,756 ft. in its 8 Winters Community, located in SE NE 13-8n-1w, resulted in a gas flow estimated at 2,500,000 cu. ft. daily. The operator, which holds about 1,000 acres in the area, was perforating the interval 4,770-4,800 ft. at the week end.

About 1,000 ft. northwest of an 8,331-ft. dry hole drilled 4 years ago by Continental Oil Co. in the San Emidio area of Kern County, Richfield Oil Corp. has staked location for a new wildcat. The test, 34-27 San Emidio-A, will be in NW 27-11n-22w. The dry Continental wildcat, M-1 Kern County Land, topped a Miocene sand at 8,052 ft. At Wheeler Ridge, Richfield will attempt to extend production about ¼ mile south with its 85-29 Kern County Land-D, staked in NE SE 29-11n-20w.

Following a 2-year lull, development has been resumed at South Mountain field near Santa Paula in the Coastal region. Shell Oil Co. has five rigs at work on the mountain-top Fairfield properties which it purchased some 6 months ago.

CALIFORNIA SUCCESSFUL WILDCATS

Kern County, ½ mile northwest extension to Belgian Anticline field: Ohio Oil Co. 1 Tulare fee, SW SW 19-30s-22e, flowed 42 bbl. 37°-gravity crude through perforations at 6,045-6,521 ft. in Oceanic sand, 32/64-in. bean, 1,431,000 cu. ft. gas, TD 6,971 ft., elev. 1,639 ft.

Orange County, new fault-block pool in West Newport field: DeWitt Langford, 1 OKA, NW SE 18-6s-10w, pumped 180 bbl. oil through perf. in "A" zone at 2,015-59 ft., TD 5,296 ft., redrilled from 1,730 to 2,170 ft., elev. 10 ft.

CALIFORNIA WILDCAT FAILURES

Kern County, Arvin area: M. K. Doumani 1 Fred, 16-31s-30e, dry, TD 929 ft., elev. 570 ft.

Kecks Corner: Jefferson Petroleum Co. 1

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Still, 14-26s-17e, dry, TD 1,908 ft., elev. 1,280 ft.

Poso Creek area: Canon Drilling Co. 3 Sally, 20-27s-27e, dry, TD 1,990 ft., elev. 735 ft.

Tejon Hills area: E. M. Easton A Core Hole, 15-11n-18w, dry, TD 510 ft., elev. 1,046 ft.

Tejon Exploration Co. 55-8 Tejon, 8-11n-18w, bottomed in gray Santa Margarita sand, dry, TD 1,429 ft.

Kings County, Alpaugh area: Standard Oil Co. of California 3 Cutter unit, 29-23s-22e, dry, TD 3,750 ft., elev. 195 ft.

Los Angeles County, Castaic area: Superior Oil Co. 1 Newhall Land & Farming, 8-4n-16w, dry, TD 13,303 ft.

Orange County, West Newport area: C. B. Douglas et al. 1 "Well," 21-6s-10w, dry, TD 2,977 ft., elev. 102 ft.

Solano County, Millar area: The Texas Co. 1 Bell, 35-7n-2e, dry, TD 4,650 ft., elev. 50 ft.

Appalachian-Ohio

Rank Wildcat Location Staked

PITTSBURGH.—A rank wildcat location has been made by United Fuel Gas Co. in Jumping Branch area of Summers County, West Virginia. It is the 6788 J. Sanford Lilly, elevation 2,613 ft., Flat Top quadrangle.

In Big Creek district, McDowell County, Godfrey L. Cabot, Inc., 46-1339 completed for 2,186,000 cu. ft. of gas in Berea sand at 4,545 ft. Gas was encountered at 4,552-54 ft., and total depth is 4,564 ft.

In Lee district, Mingo County, R. M. Kolze, Jr., completed 1 Buffalo-Winifrede Coal Co., gaging 1,195,000 cu. ft. gas from Weir sand at total depth of 2,260 ft.

In Garrett County, Maryland, Eberly & Snee completed 1 Simmons, elevation 2,405 ft., for 1,700,000 cu. ft. gas at 3,753 ft. in chert. Total depth is 3,784 ft.

Cumberland & Allegheny Gas Co. 1 H. M. Weeks, elevation 2,400 ft., tested 410,000 cu. ft. gas in chert at 3,286-96 ft., and Oriskany sand at 3,560-62 ft. Total depth is 3,571 ft.

Mid Atlantic Oil & Gas Co. 1 J. C. Laschorn, elevation 2,546 ft., resulted in a dry hole in Oriskany sand at 5,195 ft.

Blaho Oil & Gas Co. 1 Dorcie Rumer, elevation 2,490 ft., is shut down at 4,051 ft. preparing to shoot in chert and Oriskany sand.

Delaware Oil & Gas Co. 1 George Perrine, elevation 2,420 ft., recorded the Tully at 3,032 ft., and is drilling at 3,536 ft.

In Bedford County, southwestern Pennsylvania, South Penn et al-Snee & Eberly 1 Jesse B. Miller, elevation 1,666 ft., located in Napier Township, is drilling at 8,955 ft. Unity Township, Westmoreland County, Peoples Natural Gas Co. 1-4003 A. J. Dotterway, elevation 2,094 ft., is drilling at 2,642 ft.

MARYLAND SUCCESSFUL WILDCATS

Garrett County: Eberly & Snee 1 Simmons, elevation 2,405 ft., IP: 1,700,000 cu. ft. gas, Tully 3,170 ft., chert 3,744 ft., gas 3,753 ft., TD 3,784 ft.

Cumberland & Allegheny Gas Co. 1 H. M. Weeks, elevation 2,400 ft., IP: 410,000 cu. ft. gas, chert and Oriskany sand, TD 3,719 ft.

George Jackson 1 A. M. Calhoun, elevation 2,391 ft., IP: 151,000 cu. ft. gas, chert 3,260 ft., gas 3,286-96 ft., Oriskany 3,436 ft., gas 3,560-62 ft., TD 3,571 ft.

MARYLAND WILDCAT FAILURE

Garrett County: Mid Atlantic Gas Co. J. C. Laschorn, elevation 2,546 ft., dry, Tully 4,495 ft., Onondaga 5,045 ft., chert 5,068 ft., Oriskany sand 5,180 ft., TD 5,195 ft.

OHIO

U. S. Fabricators Co., drilling on their own property in the City of Wooster, Section 3, Wooster Township, Wayne County, struck a good gasser in the Clinton. The sand was topped at 3,215 ft. and drilled in to 3,228 ft., where the gage was 1,300,000 cu. ft. with 1,300 psi. pressure. Leasing activity indicates that some town-lot drilling will result.

National Gas Co. continues to get good results from its drilling in Newburg pool in Walnut Township, Fairfield County. The 1 Lawrence Upp, Section 3, reached the sand at 1,948 ft., and completed at 1,967 ft. The well was shot and made 150 bbl. in 24 hours.

Hall & Williams 8 H. L. Lifer, Section 33, Washington Township, Holmes County, logged the Berea at 609-729 ft. with a good oil showing. After shot, the well made 40 bbl. in 24 hours.

Mossholder Drilling Co. has drilled in and shot its Clinton test, 1 Rollin C. Hall, Section 8, Jackson Township, Knox County. A small show of oil and 160,000 cu. ft. of gas was encountered that increased to 600,000 cu. ft. in 3 hours after shot.

OHIO WILDCAT FAILURE

Belmont County, Warren Township: John Shepherd et al 1 John Shepherd, Sec. 2, dry, TD 2,901 ft.

Leo McRoberts Named to Gas Post by Honeywell

The appointment of Leo McRoberts as account executive in its gas division is announced by Minneapolis-Honeywell Regulator Co.

McRoberts has been wholesale manager for the company in Dallas, Tex. He will make his new headquarters at the company's office in Minneapolis, and will specialize in sales of space-heating equipment.

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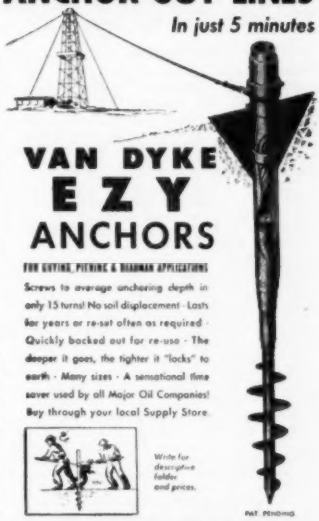

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Kansas

Arbuckle Produces in Ellsworth County Test

IMPERIAL PETROLEUM CO. is opening a new Arbuckle lime producing area in southwestern Ellsworth County, where its 1 West, NE NW SW 20-17-10, swabbed 140 bbl. of oil in an 8-hour period prior to acidizing. The area is about a mile east of production of the Kraft-Prusa field and about the same distance north of the Bloomer pool. Top of the pay was logged at 3,282 ft. (—1,476 ft.). Hole is open below 3,284 ft. to 3,290 ft., total depth. Oil and gas showings also were found in the Lansing-Kansas City lime, topped at 2,950 ft.

Casing has been run to test promising oil showings encountered in a wildcat located 2 miles west of Great Bend, in the south central part of Barton County. The test, Leon Huff 1 Shaffer, SE SE SE 23-19-14, is a potential producer in three horizons, including the Lansing-Kansas City, topped at 3,211 ft. (—1,870 ft.); the conglomerate, topped at 3,428 ft.; and the Arbuckle, topped at 3,489 ft. Total depth is 3,505 ft. A 30-minute drill-stem test at 3,240-65 ft. in the Lansing yielded 1,070 ft. of oil.

The abandoned Peach pool, located a mile west of the Trapp pool, in northern Barton County, has prospects of being revived. Anschultz Drilling Co. 1 Chaloupka, SW SW NE 25-16-14, first operation in that immediate area in a long time, is preparing to test showings encountered in both the Arbuckle and Lansing-Kansas City lime zones. Total depth is 3,430 ft., 10 ft. in the top of the Arbuckle, logged at 3,420 ft. (—1,452 ft.).

Morris Sitrin and Murfin Drilling Co. are putting their 1 Ostmeyer, NW NW SW 31-6-19, northwestern Rooks County wildcat, on the pump following a series of swabbing tests of Arbuckle lime, topped at 3,544 ft. (—1,474 ft.). Latest tests, made with hole deepened to 3,552 ft. and with a total of 3,000 gal. of acid used, produced 1½ bbl. of oil per hour. Location is 2 miles northwest of the Locust Grove pool.

KANSAS SUCCESSFUL WILDCAT

Sedgwick County: Drillers Producing 2 Petrie, NE SW NW 35-26s-1w, 30 bbl. oil from Viola at 3,447-48 ft., TD 3,466 ft.

KANSAS WILDCAT FAILURES

Barber County: Lion Oil 2 Gentry, SW SW SE 1-33s-15w, dry, TD 5,256 ft.

Barton County: N. C. R. A. 1 Allen, NW NW SW 23-16s-13w, dry, TD 3,472 ft.

Alpine 1 Karst, NE NE SW 12-16s-15w, dry, TD 3,434 ft.

Ash-Mur Drilling 1 Slentz, SW SW NE 9-19s-13w, dry, TD 3,500 ft.

Cheyenne County: Brack 1 Judy est., SE SE NW 26-1s-39w, dry, TD 5,142 ft.

Cowley County: Flynn Oil 1 Warren, NE NE NE 15-35s-5e, dry, TD 3,175 ft.

Holcomb 1 Hulme, SE SE NW 14-30s-6e, dry, TD 2,917 ft.

Ellis County: Coppinger et al. 1 Brungardt, NE SE NE 1-13s-17w, dry, TD 3,615 ft.

Herndon Drilling 1 Skaggs, SE SE SE 7-12s-20w, dry, TD 4,058 ft.

Graham County: Nadel & Gussman 1 Green, SW SW NW 32-8s-21w, dry, TD 3,782 ft.

Gray County: Continental Oil 1 Wade, NE NE SW 3-29s-28w, dry, TD 6,327 ft.

Marion County: Ingling 1 Heerey, NW NW NW 29-20s-3e, dry, TD 2,935 ft.

Morris County: Carter Oil 1 Lindgren, NW NW NE 18-15s-18e, dry, TD 2,912 ft.

Ness County: B & R et al. 1 Elmore, SW SW SW 8-16s-21w, dry, TD 4,883 ft.

Norton County: The Texas Co. 1 Harmonson, SE SE NE 23-4s-23w, dry, TD 3,748 ft.

Rice County: Allan et al. 1 Swisher, NE NE NW 13-20s-7w, dry, TD 3,428 ft.

Rooks County: G M R 1 Bohning, SW SW SE 17-10s-17w, dry, TD 3,725 ft.

Sumner County: The Texas Co. 1 Wethington, NW SE NW 30-33s-3w, dry, TD 4,675 ft.

Trego County: Finston & Murfin 1 Hixson, SE SE SE 33-11s-23w, dry, TD 4,233 ft.

Prine Drilling 1 Howat, SW SW NW 19-12s-24w, dry, TD 4,448 ft.

Central Area

MICHIGAN

Ogma Development Co. hit the Golden Lane Dundee oil pay in the prolific but narrow Pinconning oil pool this week and pushed the producing horizon of the pool a full half mile to the northeast and into Section 36-17n-4e, Pinconning Township, Bay County. Ogma's 2 Johnson, NW NW NW 36-17n-4e, a half mile from Swan-King Oil Co. 1 Paterick producer and direct east and north 10-acre offset to field failures, was reported to be flowing 6 to 7 bbl. of oil an hour natural and was being acidized. (Unofficial late reports after acid indicated well was flowing 50 bbl. an hour). Dundee oil pay was logged at 2,803-13 ft., and hole was bottomed out at that depth. Top of Dundee (black lime) was picked at 2,798 ft. The 2 Johnson appeared to be as good a producer as the 1 Paterick which to date has been the best producer in Pinconning pool.

This is Ogma's second recent attempt to locate the Pinconning Golden Lane pay. Company completed the 1 Johnson, a failure, in NW SW NW 36-17n-4e in August.

The new flowing well, it was reported, will stimulate two new locations for the drill in the immediate future. Ogma was reported to be ready to move across a 40-acre northwest to start its next test, while Swan-King Oil Co., with at least 2 offsets undrilled to the 2 Johnson, will move first to the southwest 10-acre offset.

MICHIGAN SUCCESSFUL WILDCAT

Osceola County, Sherman Township: Mogul Oil Co. 1 Hammar, SW SW NE 20-20n-

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9w, Dundee 3,861 ft., 12 bbl., TD 3,872 ft., PBTD 3,870 ft. Well flowed as much as 50 bbl. natural before acid brought in bottom-hole water.

MICHIGAN WILDCAT FAILURES

Allegan County, Ganges Township: Louis Zellman 2 Wilkenson, SW SW SE 27-2n-16w, Traverse 1,196 ft., dry, TD 1,240 ft.

Lee Township: Ford Oil Co. 1 Walker, NE SW NW 36-1n-15w, Traverse 1,191 ft., dry, TD 1,231 ft.

Antrim County, Central Lake Township: Naph-Sol Refining Co. 1 Dunson, SE NE SW 14-31n-8w, dry in Richfield, TD 1,819 ft.

Barry County, Orangeville Township: R. H. Schau 1 Schau, SE NW SE 28-2n-10w, Traverse 1,686 ft., dry, TD 1,746 ft.

Tosco County, Burleigh Township: Don Rayburn 1 Partlo, SW SE SE 6-21n-5e, Berea 1,800 ft., dry, TD 1,860 ft.

Mason County, Logan Township: McClure Oil Co. 1 Lyon, SE NW SE 12-17n-15w, Dundee 2,557 ft., dry, TD 2,708 ft.

Missaukee County, West Branch Township: Union Development Co. 1 Potter, NE SE NE 5-23n-6w, dry in Richfield, TD 4,907 ft.

Mason E. Holloway 1 Walker, NE SW NW 14-23n-6w, dry in Richfield, TD 4,819 ft.

Newaygo County, Lincoln Township: Naph-Sol Refining Co. 1 DeLong, SE SW NW 32-14n-13w, Traverse 2,288 ft., dry, TD 2,290 ft.

ILLINOIS

A new producing area is being opened 3 miles northeast of Carmi, White County, where George & Wrather Drilling Co. appears to have a good well in its 1 Winter, SW NW NW 32-4s-10e. Testing O'Hara lime, one of the two zones which made good showings on drill-stem tests, the well swabbed at an average rate of 7 bbl. of oil per hour after being acidized. The location is more than a mile from any other production.

The O'Hara pay is at 3,118-25 ft., where casing, run through the zone to 3,220 ft., is perforated. The well also had good saturation in Aux Vases sand at 3,028-38 ft., opposite which an alloy section was run in the casing string, and which will be tested later. A drill-stem test in the latter pay got a strong showing of gas and recovered 1,180 ft. of clean oil with some mud-cut oil and a small amount of salt water. McClosky lime, drilled to 3,263 ft., carried only a slight show.

The same company also has an indicated Waltersburg sand discovery in Richland County at its 1 Harmon, SE SE SW 29-3n-14w. Saturation was logged at 2,363-68 ft. Hole was drilled to 3,279 ft. but has been plugged back to that zone. Oil string is cemented on top of the pay at 2,360 ft. Location is 2 miles east of Calhoun and about 1½ miles north of production of the Parkersburg Consolidated pool.

ILLINOIS SUCCESSFUL WILDCATS

Hamilton County: Ralph Halbert et al. 1 Auten heirs, NW NW SW 32-6s-5e, IP 250 bbl., Aux Vases 3,236-47 ft., TD 3,247 ft.

Jefferson County: Perrine & Perrine 1 Ellis, NW NW NE 30-1s-4e, IP 40 bbl., Aux Vases 2,671-77 ft., TD 2,677 ft.

Richland County: Sanders & Fye Drilling Co. 1 Phillips, NE NE SW 18-3n-11e, IP 80 bbl., McClosky 3,200-07 ft., TD 3,288 ft.

ILLINOIS WILDCAT FAILURES

Bond County: T. M. Conrey 1 Neumann, C NE NW 1-4n-4w, dry, TD 1,166 ft.

Christian County: S. C. Yingling 1 Anderson, NW NE SE 34-15n-1w, dry, TD 2,185 ft.

Gallatin County: Arnold Valter 1 Trousdale, SW NE SE 24-8s-8e, dry, TD 2,900 ft.

J. Buchman and C. E. O'Neal 1 Harrington, SW SW NE 3-8s-9e, dry, TD 2,644 ft.

Jefferson County: T. S. Doran 1 Cole, NW NW NW 9-3s-4e, dry, TD 3,041 ft.

Lawrence County: J. L. Crawford 1 Slover, SE SE SW 19-4n-13w, dry, TD 2,751 ft.

Marion County: W. E. Weidler 1 Frazier, SE SE SE 17-1n-1e, dry, TD 2,056 ft.

H. F. Robinson 1 Carter, NW NW NE 18-4n-2e, dry, TD 1,950 ft.

Richland County: Calvert Drilling, Inc., 1 Stoll, NE NE SE 18-4n-11e, dry, TD 3,219 ft.

Washington County: J. W. Everhart and Ashland Oil & Refining Co. 1 Moeller, NW NW NW 2-3s-4w, dry, TD 2,650 ft.

INDIANA WILDCAT FAILURES

Knox County: Olds Oil Co. 1 Decker, NE SW SW 33-1n-11w, dry, TD 2,256 ft.

Gopher Drilling Co. 1 Vollmer, NEc Survey 13-2n-10w, dry, TD 1,793 ft.

Pike County: A. Doty et al. 1 Troxler, SEc Survey 4-1n-9w, dry, TD 1,714 ft.

Posey County: Lynch Oil Co. 1 Alexander, NE SW NW 9-6s-14w, dry, TD 2,646 ft.

Sullivan County: Superior Oil Co. 1 Thompson-Osburne, NE NE NW 29-9n-10w, dry, TD 2,630 ft.

EASTERN KENTUCKY

In Big Sandy gas field, Pike County sector, Kentucky West Virginia Gas Co. completed 6016 Issac Epling for a good natural gas well. Located on Rockhouse Creek, the well on open flow made 1,212,000 cu. ft. of gas daily from the Maxon (Mississippian) sand at a total depth of 1,935 ft.

In the same field but in the Floyd County sector and located on Mitchell Fork, the same company also have an excellent producer at 1 John Hamilton, which made a natural open flow of 1,400,000 cu. ft. of gas daily from Devonian black shale at 2,945-3,012 ft., total depth.

WESTERN KENTUCKY

An indicated oil discovery in northeastern Hopkins County is opening an extensive undeveloped area in western Kentucky for exploration. The prospective discovery well is George Hoffman and Basin Drilling Co. 1 Combs-Ashby Community, in the SW SE NW 14-L-26, which found good saturation in both the Aux Vases sand and McClosky lime, and also gas showings in Tar Springs sand. Location, 10 miles northeast of Madisonville, county seat, is 8 miles from nearest production, the small Slaughters pool in southern Webster County. It is about 7 miles south of the Rough Creek fault.

Best showings were in Aux Vases sand, in which a drill-stem test at 2,631-43 ft., with tester open 44 minutes, got gas in 3 minutes and flowed clean oil during the final 4 minutes. Indicated bottom-hole pressure was 1,100 psi. Following a 60-minute drill-stem at 2,748-56 ft. in McClosky lime, there was 2,286 ft. of gas, 45 ft. of clean oil, 90 ft. of muddy oil, and 90 ft. of sulfur water in the pipe. Tar Springs gas showings were at 2,069-82 ft. Total depth is 2,782 ft. with casing run to 2,781 ft. for completion.

Production so far in Hopkins County has been small, mostly gas, and limited to a few widely scattered spots.

Approximately 2,000 ft. to the south of the Hopkins discovery, in Section 14, LaFitte Co. is testing showings encountered in Tar Springs sand at its 2 fee (minerals). Prospective pay is at 2,053-70 ft., to which zone the hole was plugged after drilling to 2,765 ft. First tests got only small shows, but since then, the pay has been shot and at latest report hole was being cleaned.

Tuley & Carter Drilling Co.'s prospective discovery well, 1 Royster, in SE SE NE 5-N-24, 2 miles southwest of Robards, in southern Henderson County, and a mile east of the Poole field, swabbed 2 bbl. of oil per hour natural and 5 bbl. per hour after a 60-qt. shot. Pay zone being tested is Hardinsburg sand at 1,991-2,010 ft. (total depth). Production in the Poole field is from Tar Springs sand. Nearest Hardinsburg production is 5 miles distant.

One mile to the south, in Section 7, in northern Webster County, Basin Oil Corp. 2 Luther Royster swabbed 1 bbl. of oil per hour natural from its prospective McClosky lime zone at 2,557-61 ft. for another new pool and pay zone discovery east of the Poole field. Pay zone since then has been acidized with 3,000 gal. and hole is being cleaned for further tests. Total depth is 2,570 ft. Drilling already is under way at a north offset, and two additional locations have been made.

WESTERN KENTUCKY WILDCAT FAILURES

Henderson County: W. Sargent and Basin Drilling Co. 1 Beasley, 2-Q-25, dry, TD 2,274 ft.

McLean County: T. M. Egan 1 Nall, 4-L-28, dry, TD 2,104 ft.

Muhlenberg County: R. Sapp 2 Gardner, 25-H-32, dry, TD 505 ft.

Union County: Peek Drilling Co. 1 Cambron estate, 21-P-18, dry, TD 3,100 ft.

Louisiana-Arkansas

Arkansas Has New Discovery Prospect

SHREVEPORT.—A new Cotton Valley producing area is indicated for Lafayette County, Arkansas, between McKamie-Patton and Dorcheat-Macedonia (Columbia County) fields. California Co. 1 Burton, C NE NE 9-18s-23w, ran a 20-minute drill-stem test at 7,336-53 ft. In breaking down, oil showed on the 15th stand and the well blew out on the 20th stand. Recovery was an estimated flow of more than 4,000 ft. of 43°-gravity oil with bottom hole flowing pressure of 1,815 psi. The venture, planned to 9,700 ft., is drilling ahead below 7,420 ft. Travis Peak was encountered at 5,560 ft., and Cotton Valley at 6,970 ft.

North Louisiana.—In Bossier Parish, Stanolind Oil & Gas Co. will begin testing oil showings in the Tokio and Paluxy at its 1 Biedenharn, C W/2 SW NW 22-21n-14w. Operator set 5½-in. casing at 2,840 ft. Electrical survey logged Saratoga at 1,302 ft., base Annona 1,649 ft., base Ozan 1,801 ft., Tokio 1,863 ft., Lower Cretaceous 2,317 ft.

Tensas Parish has a new Tuscaloosa prospect at Petersen Drilling Co. 1 Desha Lumber Co., C SW NE 10-13n-10e. A 20-minute drill-stem test at 7,469-80 ft. recovered 40 ft. of clean pipe line oil. Bottom-hole pressure flowing was 3,275 psi.; shut in, 3,300 psi.

NORTH LOUISIANA SUCCESSFUL WILDCATS

Concordia Parish: Hunt Oil Co. and Gulf Refining Co. 1 Yakey, C NW NW 29-4n-8e, pumped 80 bbl. 45°-gravity oil from Wilcox at 6,944-48 ft., TD 7,500 ft., opens Cocodrie Bayou.

Hunt Oil Co. and Gulf Refining Co. 2 Yakey, C SE SW 42-4n-8e, pumped 49 bbl. 46°-gravity oil from Wilcox at 6,552-56 ft., TD 7,500 ft., opens W. Cocodrie Bayou.

Webster Parish: Atlantic Refining Co. 1 Holley, 1,880 ft. S and 660 ft. W. NEc 26-18n-9w, 6,590,000 cu. ft. gas from Pettit at 6,766-84 ft. and Travis Peak at 8,570-88 ft., TD 10,863 ft., new dual pay zone in Sibley.

NORTH LOUISIANA WILDCAT FAILURES

Concordia Parish: Sun Oil Co. 1 School Board, 660 ft. S N line and 660 ft. W NW line Block 3, 64-2n-8e, dry, TD 9,115 ft.

Stanolind Oil & Gas Co. 1 Quinn, C SE NE 12-4n-6e, dry, TD 7,282 ft.

Hunt Oil Co. and Gulf Refining Co. 3 Yakey, C SE SE 25-4n-7e, dry, TD 7,515 ft.

Madison Parish: Gulf Refining Co. 1 Carpenter et al, 1,141 ft. N and 994 ft. W NEc Sec. 35, 33-16n-14e, dry, TD 2,600 ft.

ARKANSAS WILDCAT FAILURES

Miller County: Simmons et al 1 Frost Trust est., 50 ft. SE C SE SW SE 35-16s-26w, dry, TD 4,902 ft.

Nevada County: Sinclair Oil & Gas Co. 1 Nichols, 660 ft. N and W NW 30-14s-22w, dry, TD 5,964 ft.

Union County: Lewton Oil Corp. 1 Union Saw Mill "B," SW SW SW 35-18s-14w, dry, TD 4,205 ft.

WHERE YOU CAN'T GET WATER . . .

Humble Oil and Failing Exploration Co. operate a fleet of truck-mounted compressors in exploration areas where it is difficult to obtain water. Note efficient air ejection, by 250 cfm Jaeger Compressor. This speeds bit penetration as much as 40%.

Where water for mudding is not readily available, Failing Exploration Co. and Humble Oil Co. are efficiently using compressed air to blow cuttings from shot holes. A Jaeger "new standard" Model 250 Compressor is used with the rig shown above because its rated capacity of 250 cfm of air at 100 psi (instead of the usual 210 cfm) enables it to maintain the 30 to 40 lbs. gauge pressure needed to eject cuttings from 5" holes drilled to 30 to 40 ft. depths. Keeping the hole clean with adequate air pressure speeds drill penetration as much as 40% and bit life is doubled in some exploration areas.

Jaeger Compressors are preferred for shot hole drilling because they deliver 15% to 25% more air than any comparable old-standard unit, and they supply compressed air at lowest cost per cubic foot of any compressor on the market. Available in capacities of: 250 cfm (instead of old-standard 210), 365 cfm (instead of old-standard 315), and 600 cfm (instead of old standard 500). See your Jaeger distributor or write for Catalog JC-1.

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Operations During First 10 Months Show Slight Increase Over 1950

by Polly DeArmond

AN analysis of cumulative completion and footage figures reveals that operations during the first 10 months of this year continue to hold a slight edge over the same period last year. The total number of new wells completed from January 1 to November 1 was 36,497, an increase of 714 wells, or 1.9 per cent over 1950. Footage drilled reached 140,093,961 ft., a gain of 9,406,308 ft., or 7.2 per cent.

With such a small difference in completions, the shifts in depth classifications become more significant . . . the greater the depths, the larger percentage increases progressively. For 1951 the shallowest depth class declined 7.5 per cent, while completions from 2,500-5,000 ft. gained 6.1 per cent. The 5,000-7,500-ft. category was up 6.7 per cent, and the 7,500-10,000-ft. division increased 14.9 per cent. Wells completed between 10,000-12,500 ft. climbed 15.0 per cent, and the deepest wells (over 12,500 ft.) soared 44.5 per cent.

10-Month Standings

Appalachian.—New York reported an increase of 49 wells, or 8.7 per cent, over the same period of last year. Pennsylvania was up 93 completions, or 6.9 per cent. West Virginia declined 47 wells, or 8.5 per cent. Maryland jumped 28 wells for a 933.0 per cent gain.

North Central.—Ohio fell 66 wells, or 7.5 per cent. Kentucky climbed 110 completions, or 11.4 per cent. Illinois dropped 361 wells, or 15.1 per cent. Indiana was off 192 completions, 14.4 per cent. Michigan slumped 125 wells, 16.4 per cent.

Southern.—Louisiana decreased 200 completions, or 9.9 per cent. Arkansas added 26 wells, 7.9 per cent. Mississippi increased 29 completions, 10.8 per cent. The Alabama-Georgia-Florida group was down 3 wells, 6.2 per cent.

Southwestern.—Texas completed 128 more wells for a 0.9 per cent increase. New Mexico was up 45 wells, or 8.8 per cent.

Mid-Continent.—Kansas soared 373 completions, up 11.2 per cent. Nebraska was up 71 wells, 5.9 per cent. Oklahoma gained 142 completions, 3.1 per cent.

Rocky Mountain and West Coast.—Montana dropped 32 completions, or 14.8 per cent. Wyoming rose 115 wells, 22.9 per cent. Colorado jumped 152 completions, 217.0 per cent. Utah was up 5 wells, 31.3 per cent. California surged 453 completions, 30.5 per cent.

1951 Status

October displaced September as third-ranking month in activity so far this year. Total completions were 572 wells, or 12.8 per cent, below the high established in August, and footage was down 2,333,476 ft., or 13.6 per cent, from the August record. October was 76 wells, or 1.9 per cent, under May (the second most active month), while footage slipped 569,106 ft., or 3.7 per cent, from May's second-place footage figure.

SUMMARY OF COMPLETIONS—OCTOBER 1951

	Total comp.	Oil	Gas	Dry	Under 2,500 ft.	2,500-5,000 ft.	5,000-7,500 ft.	7,500-10,000 ft.	10,000-12,500 ft.	Over 12,500 ft.	Total footage	Rigs and drilling
New York	66	34	0	32	66	0	0	0	0	0	95,400	50
Pennsylvania	167	74	26	67	167	0	0	0	0	0	302,107	176
West Virginia	71	9	50	12	38	31	2	0	0	0	193,721	180
Maryland	2	0	1	1	0	2	0	0	0	0	8,347	39
Ohio	92	32	25	35	54	38	0	0	0	0	189,045	147
Kentucky	140	56	9	75	111	29	0	0	0	0	250,343	103
Illinois	232	95	4	133	90	142	0	0	0	0	555,985	280
Indiana	159	41	0	118	141	18	0	0	0	0	285,942	243
Michigan	58	11	1	46	32	26	0	0	0	0	140,089	152
Kansas	405	205	39	161	39	357	9	0	0	0	1,384,921	549
Nebraska	19	6	1	12	1	10	7	1	0	0	93,577	42
Oklahoma	485	252	27	206	156	233	71	18	5	2	1,674,746	922
Texas	1,256	765	62	429	257	430	385	145	35	4	6,127,283	1,833
North	188	115	0	73	76	78	33	1	0	0	632,458	236
West Central	173	76	2	95	55	77	41	0	0	0	613,953	241
West	410	334	4	72	50	97	214	33	13	3	2,304,495	788
Panhandle	66	27	28	11	6	55	2	3	0	0	226,167	89
Eastern	85	52	4	29	9	31	26	18	1	0	451,438	93
Gulf Coast	185	87	18	80	10	49	36	70	19	1	1,242,893	195
Southwest	149	74	6	69	51	43	33	20	2	0	655,879	191
Louisiana	244	134	22	88	81	41	35	36	38	13	1,391,611	291
Northern	151	79	20	52	78	35	26	11	1	0	494,766	115
Southern	93	55	2	36	3	6	9	25	37	13	896,845	176
Arkansas	49	24	5	20	16	25	5	3	0	0	174,772	48
Mississippi	33	13	0	20	0	3	18	8	4	0	241,901	36
Ala., Ga., Fla.	2	0	0	2	0	1	1	0	0	0	9,270	8
Montana	22	11	2	9	15	7	0	0	0	0	42,354	97
Wyoming	69	44	1	24	11	21	26	10	1	0	340,843	175
Colorado	34	9	2	23	2	6	26	0	0	0	166,937	71
Utah	3	0	0	3	1	1	1	0	0	0	11,640	39
New Mexico	54	28	10	16	13	21	5	8	4	3	253,246	228
California	220	171	9	40	77	91	28	15	6	3	869,413	270
Miscellaneous	¶2	0	0	2	1	0	1	0	0	0	7,442	22
Total October 1951	3,884	†2,014	296	*1,574	1,369	1,533	620	244	93	25	14,840,935	‡5,998
Total September 1951	3,799	1,975	233	1,591	1,346	1,519	599	230	80	25	14,185,474	6,051
Total October 1950	3,762	2,019	275	1,468	1,382	1,541	543	195	81	20	13,654,378	5,099
Cumulative 1951	36,497	19,386	2,412	14,699	12,202	15,128	5,946	2,129	910	182	140,093,961	
Cumulative 1950	35,783	20,211	2,386	13,186	13,186	14,255	5,572	1,853	791	126	130,687,653	
Alberta, Canada	127	†65	13	49	15	52	57	2	1	0	553,243	
Cumulative 1951§	1,014	651	84	279	108	437	403	15	1	0	4,064,960	
Cumulative 1950	820	618	38	164	47	547	216	9	1	0	3,221,074	

*Incl. 133 service wells: N. Y. 32, Pa. 63, Ohio 6, Ind. 1, Mich. 8, Kans. 4, Okla. 11, No. Tex. 4, Pan. Tex. 1, S.W. Tex. 3. †Incl. 33 condensate wells: Okla. 6, No. Tex. 1, W. Tex. 1, E. Tex. 5, Tex. Gulf 7, S.W. Tex. 5, So. La. 6, Miss. 2. Canada incl. 1 condensate. ‡Incl. all wells rigged up and/or drilling at month end. ¶Incl. 1 No. Dak at 5,383 ft., and 1 Mo. at 2,059 ft. §Revised.

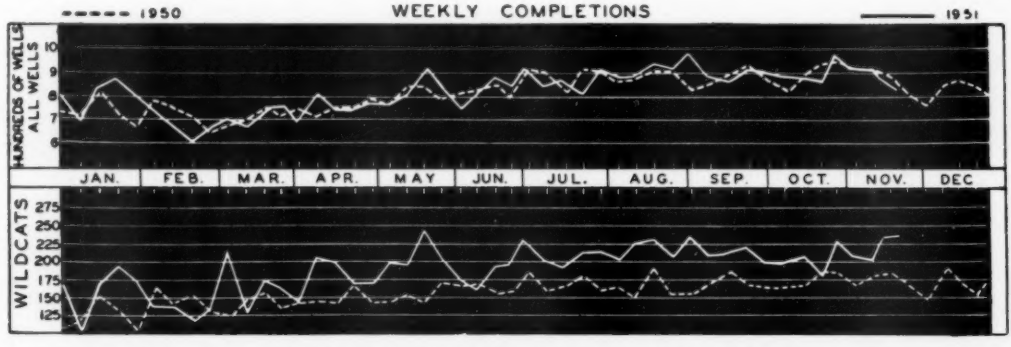
CURRENT STATISTICS

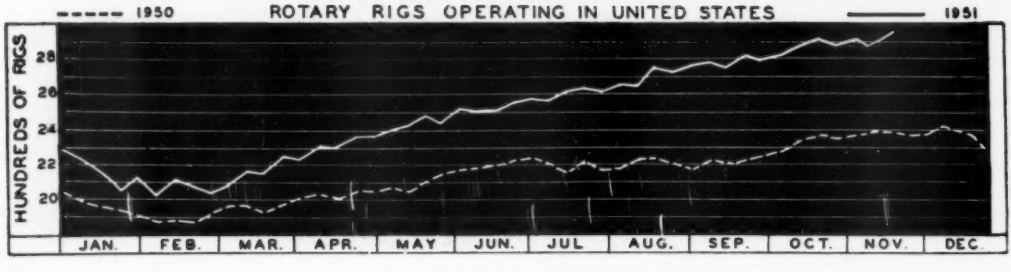
EXPLORATION

WEEKLY WELL COMPLETIONS . . . . . WEEK ENDED NOVEMBER 24, 1951

	Total of all wells					Nov. 24		Wildcat completions and discoveries										
								Cumulative total, 1951										
	Comp.	Oil	Gas	Dry	Footage	1951	1950	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	14	7	0	*7	20,258	583	633	0	0	0	0	0	0	0	0	0	0
Pennsylvania	20	7	6	*7	31,044	1,303	1,246	0	0	0	0	0	0	0	2	2	4
West Virginia	13	1	10	2	33,938	560	597	0	0	0	0	0	0	0	7	4	11
Ohio	18	5	3	†10	42,770	883	945	0	0	0	1	1	1	0	6	27	34
Indiana	23	7	0	16	42,840	1,225	1,435	0	0	0	5	5	57	0	2	435	494
Kentucky	25	8	5	12	52,031	1,149	1,044	0	0	0	4	4	36	0	2	203	241
Illinois	42	21	1	†20	110,062	2,126	2,588	3	0	0	10	13	87	0	0	659	746
Michigan	18	6	1	11	51,445	692	818	1	0	0	9	10	17	0	6	291	314
Kansas	79	35	2	‡42	289,642	3,963	3,576	1	0	0	20	21	181	1	12	800	994
Nebraska	8	1	1	6	40,497	214	106	1	0	0	6	7	17	0	2	107	126
Oklahoma	94	49	4	41	425,362	5,039	4,896	5	0	0	20	25	170	5	21	664	860
Texas	290	157	12	121	1,308,237	14,973	14,915	15	0	3	83	101	680	51	116	3,115	3,962
North Central (Dist. 7-B & 9)	95	39	3	53	289,514	4,555	4,539	7	0	2	38	47	332	3	17	1,335	1,687
West (Dist. 7-C & 8)	82	63	0	19	447,338	4,567	4,479	3	0	0	14	17	168	10	8	583	769
Panhandle (Dist. 10)	14	5	7	2	60,689	651	819	0	0	0	3	3	3	0	0	0	29	31
Eastern (Dist. 5 & 6)	16	9	1	6	65,377	1,054	1,049	0	0	0	3	3	9	9	2	210	230
Gulf Coast (Dist. 2 & 3)	34	18	0	16	219,179	2,066	2,090	3	0	0	10	13	87	20	55	430	592
Southwest (Dist. 1 & 4)	49	23	1	25	226,140	2,080	1,939	2	0	1	15	18	82	9	34	528	653
Louisiana	50	28	4	18	342,197	1,970	2,211	2	0	1	9	12	42	10	8	269	329
Northern	26	16	4	6	116,350	1,084	1,186	2	0	1	4	7	15	0	5	159	179
Southern	24	12	0	12	225,847	886	1,025	0	0	0	5	5	27	10	3	110	150
Arkansas	12	7	0	5	49,952	385	371	0	0	0	3	3	15	1	2	78	96
Mississippi	10	1	0	9	70,048	331	282	0	0	0	7	7	14	4	0	133	151
Southeastern States	0	0	0	0	0	46	52	0	0	0	0	0	1	0	0	18	19
Montana	23	8	2	13	63,657	230	246	0	0	0	8	8	0	0	1	41	42
Wyoming	11	6	0	5	56,258	683	542	1	0	0	0	1	15	0	1	99	115
Colorado-Utah	2	0	1	1	9,864	271	97	0	0	1	0	1	9	0	7	121	137
New Mexico	21	7	13	1	92,212	634	555	0	0	1	0	1	13	0	10	72	95
California	43	30	0	13	163,814	2,101	1,621	2	0	0	9	11	54	0	4	418	476
Miscellaneous (Md.)	4	0	3	1	16,269	75	50	0	0	3	1	4	1	0	24	50	75
Total United States	820	391	68	361	3,312,397	39,441	38,826	31	0	9	195	235	1,410	72	233	7,606	9,321
Total previous week	896	455	68	373	3,327,156			42	2	7	184	235	1,379	72	224	7,411	9,086
Total November 24, 1950	809	415	60	334	3,141,606			22	0	5	142	169	1,021	68	193	5,889	7,171

Service wells included: *7, †2, ‡1





DAILY AVERAGE PRODUCTION FOR WEEK

	Nov. 24 crude oil	B. of M. Nov. demand	Nov. 17 crude oil
Alabama	2,800	2,400	2,850
Arkansas	76,450	85,000	76,550
California	985,100	983,000	985,600
Colorado	74,800	75,000	75,450
Eastern	60,000	61,000	54,125
Florida	1,625	1,600	1,625
Illinois	165,000	161,000	161,300
Indiana	31,400	31,000	32,200
Kansas	318,650	319,000	316,600
Kentucky	32,600	31,000	34,600
Louisiana	601,125	655,000	604,075
North Louisiana	110,500		113,450
South Louisiana	490,625		490,625
Michigan	36,300	40,000	33,700
Mississippi	98,950	104,000	96,100
Montana	24,200	26,000	24,100
Nebraska	7,600	8,000	7,750
New Mexico	149,725	155,000	149,725
Oklahoma	511,700	527,000	508,900
Texas	2,789,000	2,750,000	2,789,000
Dist. 1 (Southwest)	33,300		33,300
Dist. 4 (Southwest)	255,200		255,200
Dist. 2 (Gulf Coast)	166,500		166,500
Dist. 3 (Gulf Coast)	466,675		466,675
Dist. 5 (Eastern)	54,125		54,125
Dist. 6 (Eastern)	121,900		121,900
East Texas field	277,500		277,500
Dist. 7-C (West)	113,750		113,750
Dist. 8 (West)	975,675		975,675
Dist. 7-B (W. Central)*	83,175		83,175
Dist. 9 (N. Central)	158,000		158,000
Dist. 10 (Panhandle)	83,200		83,200
Utah	3,800	5,000	3,900
Wyoming	183,600	190,000	185,000
Total United States	*6,154,425	6,210,000	6,143,150
Change from previous week, up	11,275		
Canada	144,700		150,820

Total U. S. production January 1-November 24 †2,011,559,900 bbl.
Same period last year (crude plus cond.) 1,767,578,710 bbl.

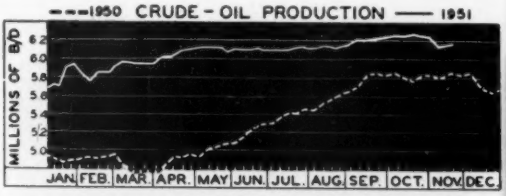
*Not including 109,780 bbl. condensate. †Including 34,572,825 bbl. condensate.

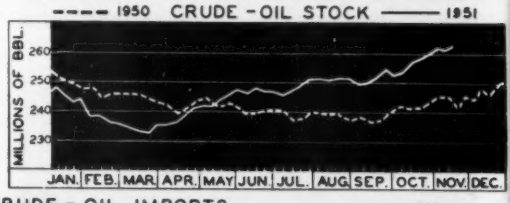
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

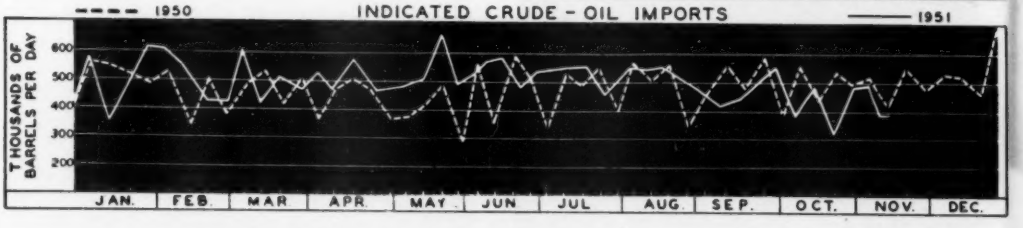
(Thousands of barrels)

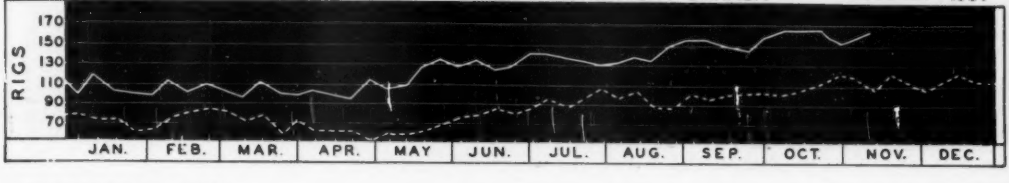
	Nov. 17, 1951	Nov. 10, 1951	Nov. 18, 1950
Pennsylvania Grade	2,015	2,003	2,255
Other Appalachian	1,621	1,546	1,409
Illinois, Indiana, Michigan	12,533	12,812	10,245
Arkansas	2,734	2,743	2,704
Louisiana	14,609	14,463	14,182
North	2,831	2,921	2,723
Gulf	11,778	11,542	11,459
Mississippi	3,431	3,472	2,056
New Mexico	7,377	7,187	6,844
Oklahoma and Kansas	40,830	41,014	37,731
Texas	128,664	126,120	118,949
East Texas	15,387	15,679	13,744
West Texas	55,108	53,464	45,934
Texas Gulf	28,743	27,991	29,568
Other Texas	29,426	28,986	29,703
Rocky Mountain	14,433	15,020	11,435
California	28,979	28,798	30,641
Foreign	5,894	6,024	6,665
Total	263,120	261,202	245,116

*Bureau of Mines.





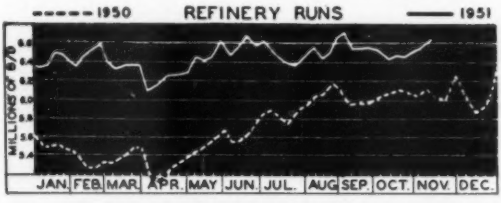


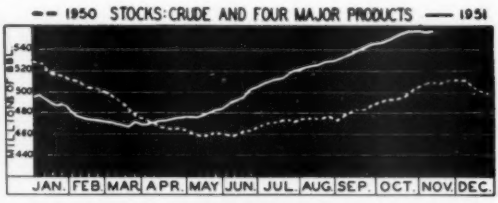


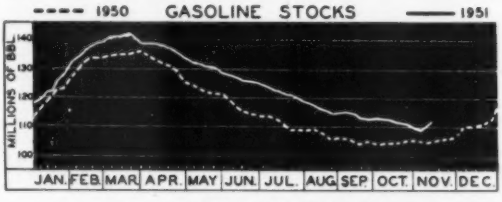
A.P.I. REFINERY REPORT, NOVEMBER 17
(Thousands of barrels)

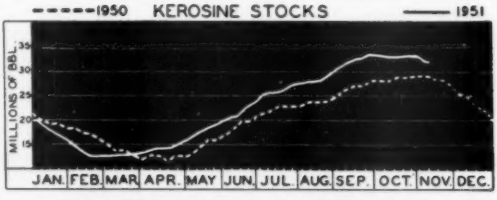
District—	Daily avg. crude runs	Daily average production				Stocks at refineries, bulk terminals, in transit and in pipe lines				Bureau of Mines, November 1950				
		Gasoline*	Kerosine	Distillate	Residual	Gasoline†	Kerosine	Distillate	Residual	Daily avg. crude runs	Daily average production: Gasoline*	Kerosine	Distillate	Residual
East Coast	1,008	422.1	52.9	283.4	249.1	24,195	11,486	35,151	12,018	903	337.6	31.1	232.7	202.4
Appalachian:														
District 1	107	46.4	6.6	15.7	13.4	2,707	666	967	667	103	40.5	6.1	12.9	12.0
District 2	77	33.7	5.7	7.6	17.0	1,063	383	296	255	65	29.9	4.3	6.8	14.4
Ind., Ill., Ky.	1,249	665.3	80.6	208.0	176.8	23,777	7,086	20,227	6,340	1,125	600.0	69.8	187.7	170.2
Okla., Kans., Mo.	547	296.6	16.7	133.7	64.0	11,599	1,841	11,704	2,117	503	276.7	17.2	105.1	60.2
Inland Texas	252	175.3	11.1	41.9	44.6	3,671	711	2,111	1,392	212	151.3	11.8	34.1	40.3
Texas Gulf Coast	1,550	713.0	124.9	374.7	276.3	17,116	5,321	14,301	7,380	1,456	677.2	119.6	337.1	261.3
La. Gulf Coast	536	249.6	80.1	106.7	60.6	6,237	3,692	3,841	2,017	489	221.6	57.3	107.2	62.4
N. La. and Ark.	94	36.1	6.6	17.6	7.6	2,751	723	1,376	182	75	29.3	8.3	17.4	7.6
Rocky Mountain:														
New Mexico	15	8.3		2.9	3.9	114		97	31	13	7.4	.3	2.4	3.2
Other Rocky Mtn.	207	101.6	9.0	43.8	44.3	3,255	334	1,741	926	205	93.5	7.0	38.7	47.2
California	975	411.1	6.1	148.0	385.7	13,846	486	8,617	15,109	936	394.2	9.0	135.6	358.9
November 17, 1951	6,616	3,159.1	400.3	1,384.0	1,343.3	110,381	32,729	100,429	48,434	6,085	2,859.2	341.8	1,217.7	1,240.1
November 10, 1951	6,573	3,069.9	410.4	1,340.0	1,296.6	109,455	32,907	102,687	48,100					
November 18, 1950	6,002	2,814.6	331.3	1,175.9	1,254.7	105,468	28,382	87,117	45,600					

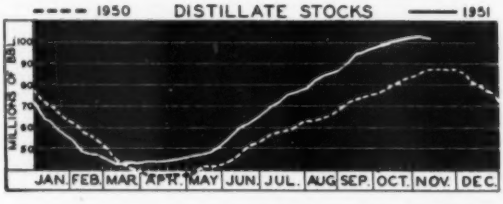
*At refineries including natural blended. †Finished and unfinished.

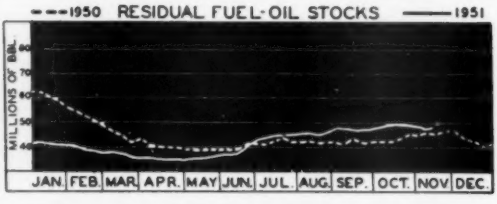


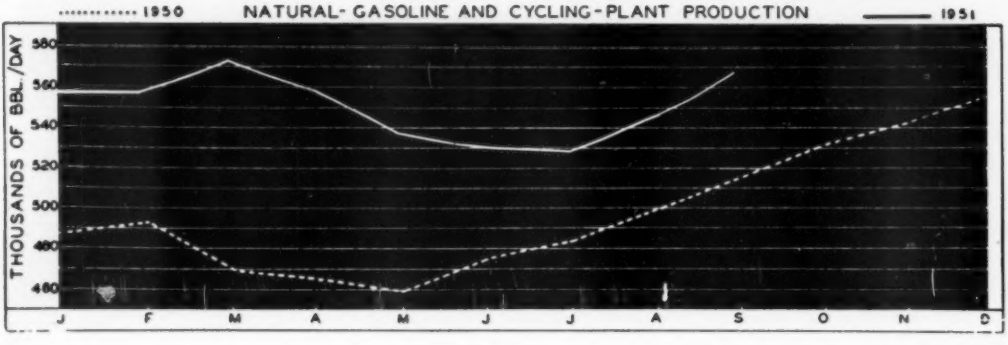












CRUDE PRICES

GRAVITY SCHEDULE

	Signal Hill, Calif.‡	Oklahoma, Kansas	Gulf Coast Tex.*	West Tex†
18-18.9	$1.93	....	....	....
19-19.9	1.98	....	....	....
20-20.9	2.03	$2.25	....	$2.12
21-21.9	2.07	2.27	....	2.14
22-22.9	2.12	2.29	....	2.16
23-23.9	2.18	2.31	....	2.18
24-24.9	2.24	2.33	$2.56	2.20
25-25.9	2.30	2.35	2.58	2.22
26-26.9	2.36	2.37	2.60	2.24
27-27.9	2.41	2.39	2.62	2.26
28-28.9	2.46	2.41	2.64	2.28
29-29.9	2.52	2.43	2.66	2.30
30-30.9	2.57	2.45	2.68	2.32
31-31.9	2.62	2.47	2.70	2.34
32-32.9	2.68	2.49	2.72	2.36
33-33.9		2.51	2.74	2.38
34-34.9		2.53	2.76	2.40
35-35.9		2.55	2.78	2.42
36-36.9		2.57	2.80	2.44
37-37.9		2.59	2.82	2.46
38-38.9		2.61	2.84	2.48
39-39.9		2.63	2.86	2.50
40 and above		2.65	2.88	2.52

*For crude from Daboval, El Campo, and Sand Point.

†Includes Lea County, New Mexico. Last general price change represented a 50-cent increase becoming effective December 6, 1947.

‡Standard Oil Co. of California.

FLAT CRUDE PRICES

Representative posted schedules per barrel.

East Texas†	$2.65
Kettleman Hills, California*	2.80
Beauregard Parish	2.60
Illinois Basin	2.77
Pecos County, Texas (Yates)	2.35
Bradford, Pennsylvania	4.25
Eastern Ill. and Western Ind.†	2.77
Tomball, Texas Gulf Coast	2.83

*37-37.9°. †35° and above.

WHOLESALE gasoline prices in areas of the north central states have followed a seasonal downward trend over the past week, but the effects of these slight reductions have not shown up yet in the Mid-Continent tank-car spot market.

About the only indication of a softer gasoline market in the Mid-Continent has been some slight shading of prices on material delivered from pipe-line terminals. It is possible that some of this shading may have been due to a need for sales from particular terminals to avoid demurrage.

The major competitor in the gasoline market served by tank-car sales from refineries in the Mid-Continent is recycle gasoline from Texas and Louisiana. The shortage of tetraethyl lead and the firm market for natural gasoline have tended to reduce plant production of motor fuel that is normally marketed as recycle gasoline. Market reports indicate that some of the material has been moving to tidewater points for export as unleaded gasoline. In other cases, part of plant production has been shifted to natural gasoline. The market for recycle gasoline has not been soft in recent weeks.

Group 3 prices for No. 2 fuel are trending slightly higher on an average for the area. Distillate stocks in District 2 decreased almost 1,200,000 bbl. for the week ended November 17. No drop was reported for the Mid-Continent part of District 2, but draft on distillate stocks in this area will come when tanks in the northern states are refilled.

Fuel markets in New York Harbor were more active during the week with buyers from the area along the canal trying to fill all available storage before the canal is closed for the winter. Higher tanker rates tend to discourage release of supplies except to regular customers.

REPRESENTATIVE QUOTATIONS

Representative spot-market quotations of leading suppliers as of November 26, 1951. Figures are f.o.b. plant for tank-car shipments in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Texas Gulf Coast
Regular gasoline, 80-82 octane	10¼-10½	12-12.75	10¾-11
Premium gasoline, 86-88 octane	11¼-11½	13.5-13.75	11¾-12
42-44 w.w. kerosine	9-9⅜	10-10.1	9
No. 2 straw fuel oil	8½-8½	9-9.25	8
No. 6 residual	$1.65-1.75	$2.45-2.60	$1.75-1.90

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	6⅞	6⅜	6⅝
Grade 18-55	8.25	7.75	8.0

LUBRICATING OILS

South Texas

300 vis., No. 2-3 neutral	13-13.5
750 vis., No. 3-4 neutral	16
2,000 No. 5-6 neutral	18-19

LUBRICATING OILS

Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	29-30
200 vis., No. 3 neutral, 0-10 pp.	17.5-18.5

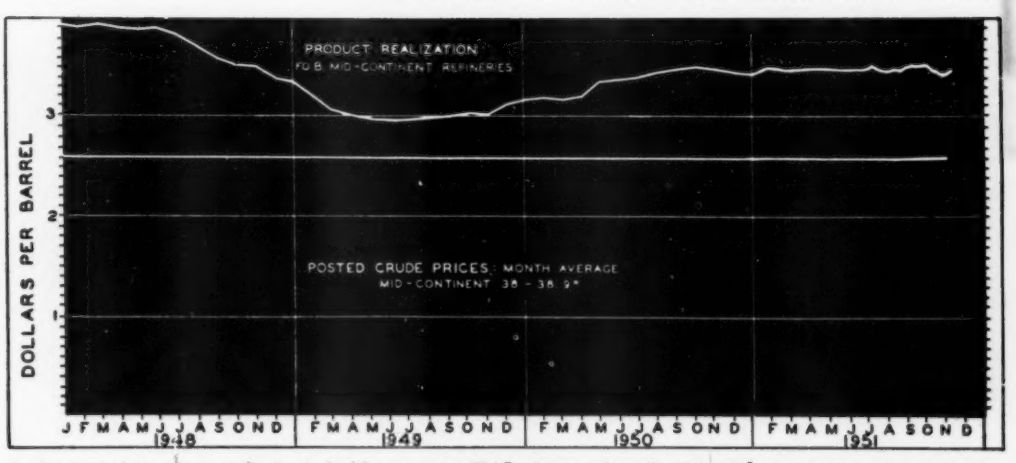
Western Pennsylvania

145-155 vis., 10 p.t. bright stock	33.5
180 vis., 0 p.t. neutral	31.5

WAX

Mid-Continent

132-134 A.M.P.	5.5


PRODUCT REALIZATION
F.O.B. MID-CONTINENT REFINERIES
POSTED CRUDE PRICES: MONTH AVERAGE
MID-CONTINENT 38 - 38.9°
DOLLARS PER BARREL
3
2
1
J F M A M J J A S O N D
1948
F M A M J J A S O N D
1949
F M A M J J A S O N D
1950
F M A M J J A S O N D
1951

In this trend chart refinery realization is based on average Mid-Continent grade crude oil (not 38° gravity only) and average prices for refinery products as published in The Oil and Gas Journal basis Oklahoma (Group 3). Refinery yields confined to gasoline, kerosine, distillate, and fuel oil. Realization averaged $3.47 for week ended November 17, $3.45 for previous week, and $3.50 for November 1950.

EQUIPMENT MEN . . . in the News

Viking Pump Opens New Dallas Service Branch

A new service branch for the Oklahoma - Texas-New Mexico area will be opened at Dallas by Viking Pump Co. early in 1952.

O. W. Phillips, associated with the company for the past 22 years, and production manager of the Cedar Falls, Iowa, factory for the past 7 years, has been appointed manager of the new branch.

The new Viking building includes office and warehouse with a total area of 3,200 sq. ft., and is located on a two-acre tract with rail spur and trucking facilities.

Twin Coach Acquires Rights Of Leyland Diesel Engines

Twin Coach Co., Kent, Ohio, has announced acquisition of exclusive American manufacturing and sales rights to the complete line of Leyland diesel engines, produced by Leyland Motors, Ltd., of England.

These engines will be sold in this country under the name of Fageol-Leyland and will be completely "Americanized" with S.A.E. standard threads incorporated into the design of the engines as well as in all accessories and fittings. Engineering of American production engines will be handled by Fageol Products Co., Kent, Ohio, a Twin Coach subsidiary, which currently manufactures Fageol gasoline and propane engines.

The Twin Coach-Leyland agreement was negotiated in England by L. J. Fageol, Twin Coach president, and the Hon. Henry Spurrier, Leyland executive director. It covers a full line of engine models with power ranges from 90 to 200 hp.

Twin Coach will offer a complete line of Fageol-Leyland industrial power units suitable for use in power shovels, tractors, drill rigs, and pumps.

Precision Tube Co. Offers New Tubing

Precision Tube Co., Philadelphia, recently announced its entry into the field of fine-drawn, precision low-carbon, welded-and-drawn-steel tubing. This new tubing offers the possibility of substitution in many places where nonferrous and alloy-metal tubing, such as aluminum, copper, and copper-base alloys, were used. The new low-carbon-steel tubing is accurately drawn to close tolerances of inside diameter, outside diameter, and wall thicknesses, and is available in a range of outside diameters from 0.500 in. to 0.010 in. with wall thicknesses down to 0.0015 in.

The new precision low-carbon steel-welded-and-drawn tubing can be used on all types of mechanical applications.

Hood Is Promoted By Hughes Tool, Ltd.

Announcement has been made of the promotion of R. D. Hood to the position of manager of Canadian operations of Hughes Tool Service Limited, with headquarters in Edmonton, Alta.

Hood has served in several capacities with Hughes Tool in the United States since 1943, having recently moved to Canada from Oklahoma City.

A. O. Smith Announces New Sales Promotions

J. W. Spoor has ben named general sales manager of the welding-products division of A. O. Smith Corp., Milwaukee.

L. V. Vonier, former sales manager, is moving into the newly created position of sales-promotion manager, where he will assist division manager L. T. Hickey, and Spoor in expanding A. O. Smith's sales of both welding electrodes and welding machines.

Spoor steps into his new responsibilities from the post of manager of A. O. Smith's product-service division. Prior to that he had been assistant to the vice president in charge of sales at Brunswick-Balke-Collender Co., Chicago.

Succeeding Spoor as product-service-division manager is Charles Smith, formerly field service manager.

Vonier has been a leading figure in the development of A. O. Smith's welding-electrode business since 1937, introducing to the industry the Smithway certified electrodes which were originally developed in 1919 by A. O. Smith for fabricating its broad line of welded products in the process equipment and line-pipe fields.

Both Spoor and Vonier will establish headquarters at Milwaukee.

Chiksan Holds National Sales Conference

The first international sales conference held by Chiksan Co. was held in Brea, Calif., from October 9 through October 12, according to G. R. Winder, vice president and sales manager.

Present at the conference were all Chiksan salesmen and commission representatives as well as delegations from the company's two subsidiaries, Chiksan Export Co. of Brea and Well Equipment Manufacturing Corp. of Houston.

In attendance at the Chiksan sales conference were, first row (kneeling): Art Edwards, Sam Blue, Ed Leicester, Elmer Rhodes, Bill Clark, Carl Gast, Frank Wiegand, Bob Perry, Ed Richard, Ed Miller, Floyd Ferguson, Chuck Russell, Joe Schlarb, Ed Landgraff, and Dale Prentice. Second row: Ed Myers, John Rittelmeyer, Harry Rogers, John Gates, Doyle Warren, Bill Connelly, Frank Burrill, Dick Winder, Stew Miller, Frank Land, Mac McCelvey, Nate Zimmerman. Third row: Lee Guill, Al Neely, Hal Stock, Bev Ragsdale, Chub Morrison, Robby Robinson, George Beecroft, Roy Shields, Durk Durkin, Hank O'Breen, Ed Vance, and Lou Smith. Fourth row: Walt Berntsen, Rollo Stover, Art Stoeltzing, Mott Moffitt, John Schmidt, Bob James, and Bill Cone. Fifth row: Doc Brill, Kenny Knutzen, Neil Thomas, Bob Jones and Pete Bily. Back row: Gus Bagnard, Chuck Holcomb, Bernie Coane, Foster Jordan, and George Cousins. Also attending the meeting but not present for the picture were: Don Jackson, Roy Irvin, and Howard Dickson.

Dominion Bridge Advances Taylor-Bailey, Cowie

Following the recent death of W. F. Angus, president and managing director of the Dominion Bridge Co., Ltd., the directors have made two appointments: W. Taylor-Bailey, formerly vice president and general manager of the company, has been appointed president and managing director, and A. H. Cowie, formerly manager of the eastern division, has been appointed vice president, general manager, and a director.

Taylor-Bailey joined Dominion Bridge in 1908 and has been closely identified with the organization since that time, in succession as draughtsman, designer, vice president in charge of sales, and vice president and general manager.

In addition to his activities with Dominion, Taylor-Bailey is also a

TAYLOR-BAILEY

A. H. COWIE

director of Dominion Engineering Works, Ltd., Dominion Hoist & Shovel Co., Ltd., Royal Bank of Canada, Robert Mitchell & Co., Ltd., National Breweries, Ltd., National Drug & Chemical Co. of Canada, Wabasso Cotton Co., Ltd., and Steel Company of Canada.

Cowie joined Dominion in Canada in 1910, serving in the drawing office, design, and contracting departments. Beginning in 1945, in succession he was appointed assistant to general manager, assistant general manager, and manager of the eastern division.

In addition to his duties at Dominion, Cowie is a director of Dominion Hoist & Shovel Co., Ltd., Eastern Canada Steel & Iron Works, Ltd., and Robb Engineering Works, Ltd.

Marley Amounces Opening Of Washington Office

The Marley Company, Inc., manufacturers of Marley water-cooling towers and air-cooled heat exchangers, announces the opening of its Washington, D. C., engineering service office on November 1, 1951.

Don Cousins, formerly associated with the engineering and sales departments of the company in Kansas City, has been named manager of the Washington office. Cousins is a graduate of the school of engineering of the University of Kansas.

Marley Company maintains 45 engineering service offices throughout the United States with representation in Canada and Mexico. The company's principal offices are in Kansas City, Mo., with manufacturing facilities in Stockton and Louisville. Warehouse facilities are maintained in Houston.

Carborundum Names Brown To New Sales Territory

C. E. Hawke, manager of the refractories division of Carborundum Co., Perth Amboy, N. J., has announced the appointment of Roy W. Brown as direct sales representative in an important new sales territory in the southwest.

Brown, formerly product specialist for Carborundum's "Monofrax" fused cast refractory line, will handle all refractory products of Carborundum in his new assignment. A ceramic-engineering graduate of Rutgers University, and later research associate and instructor at Rutgers, Brown has been with Carborundum since 1947.

Oil & Chemical Planning Additional Production

Plant expansion for increased production of coal-tar derivatives, including toluene and aromatic aviation gasoline blending stock is under way, according to an announcement by Oil & Chemical Products, Inc.

Present O. & C. manufacturing is done at the company's Galena Park (Houston) Tex., plant where toluene is obtained as a byproduct of benzene refining. In addition to toluene, aromatic blending stock will be produced, which will contribute to the production of increased quantities of aviation gasoline.

Tracy to Manage New Wheatley Sales Office

Alan C. (Al) Tracy has been appointed manager of the new Pacific Coast sales office opened by Charles Wheatley Co., San Francisco..

Tracy was formerly sales manager of Petroleum Equipment Co., San Francisco, and was also with the sales department of Marshall-Newell Supply Co.

With the opening of this office, Wheatley also announces its appointment as exclusive sales representative in the Pacific Coast area for Wheatley pumps and parts. The company recently took over exclusive sales of Wheatley pumps in the Mid-Continent area.

Ken Corp. Expands Sales Organization

An extensive sales-expansion program of Ken Corp. has necessitated a regrouping of the company's personnel in order to insure continued service to the many operators using Ken-Oil drilling fluid and Ken-Pak casing protector.

Walter Forbes, associated with the Long Beach branch of the company for the past year, has been placed in charge of sales and service in the Rocky Mountain area, working in coordination with Mud Control Laboratories, Casper, Wyo., representatives of Ken Corp. products in that area.

Jay Waldren recently joined Ken

Price Officials Gather for Anniversary Party

Top officials of H. C. Price Co. gathered in Bartlesville, Okla., on November 2 to help celebrate the company's thirtieth anniversary. It was the first time in the organization's history that all of its superintendents met together. Front row, left to right: M. J. Lane, Somastic division superintendent; C. E. Shivel, C. R. Ice, R. K. Shivel, and G. A. Reutzel, pipe-line-division superintendents, and Nelson VerSoy, Somastic division superintendent. Second row: R. P. White, Somastic division manager; J. S. Dewar, Somastic division vice president; Harold C. Price, president; John M. Thomas, pipe-line-division manager, and J. B. Harshman, pipe-line-division vice president.

Corp.'s sales and service division at Long Beach, and William Rodgers, formerly with Mud Control Laboratories, Oklahoma City, has been appointed by the company to head sales and service in the Mid-Continent area. Prior to his appointment Waldren was stationed at Ken Corp.'s Long Beach plant.

Du Pont Announces Three District Office Changes

E. I. du Pont de Nemours & Co. Inc., recently announced changes in the managerships of three district offices of its petroleum - chemicals division, effective January 1, 1952.

R. M. GLOVER

R. M. Glover, of the Wilmington sales office, will become manager of the Mid-Continent district at Tulsa; Charles D. Towery, present Tulsa manager, will be transferred to Houston as manager of the division's Gulf Coast district; Alfred R. Mullis, district manager at Houston, has been named manager of the eastern district with offices in New York City; and E. Hearn Simpson, acting manager of the eastern district office, will return to Wilmington to resume his duties as sales manager of the petroleum-chemicals division.

C. M. TOWERY

A. R. MULLIS

Glover was employed by Du Pont in 1947 as a salesman in the petroleum - chemicals division, Wilmington. He was transferred in 1948 to the Mid-Continent district as a sales representative and in 1950 was moved to the Gulf Coast district in the same capacity. Early this year he returned to the Wilmington office as a sales representative. Prior to joining Du Pont, Glover was associated with Humble Oil & Refining Co. at Baytown, Tex.

Towery was with Bethlehem Supply Co., Houston, prior to joining Du Pont in 1947 as a salesman for the petroleum-chemicals division. He has been district manager of the Mid-Continent district since May, 1950.

Mullis has been with the company since 1947 as a petroleum-chemicals division service representative in the Gulf Coast district, where he has served as manager since June 1950.

Filtrol To Build New Research Laboratory

Filtrol Corporation research laboratory now under construction.

Filtrol Corporation, major producer of petroleum cracking catalysts, absorbents, and related products, announces construction of a new 16,000-sq. ft. research building to house its varied and greatly expanding research activities. The new building will incorporate the most advanced facilities for conducting research in product developments and for efficient use of Filtrol products in the many industries throughout the world.

Completion of the new building is expected before the middle of 1952.

Drewes Is Elected Vice President of National Lead

Alfred H. Drewes has been elected a vice president of National Lead Co.

Drewes became a member of the board of directors and the executive committee in October of last year. He has been assistant to the president of the company since 1947 and is a director of Baker Castor Oil Co., and of Titanium Metals Corp. of America. Since joining the company 16 years ago, Drewes has held various positions in the accounting, auditing, and administrative operations of the company.

Joseph J. Morsman, Jr., was named treasurer of the company, succeeding Charles Simon, who recently retired after 47 years of company service. Morsman joined National Lead in 1935 and was made assistant treasurer in 1941. In 1946 he was appointed assistant controller, retaining both positions until his present appointment.

Barrett Division Orders 100 All-Welded Tank Cars

The Barrett division of Allied Chemical & Dye Corp. has placed an order with the American Car & Foundry Co. for 100 all-welded tank cars of 12,500-gal. capacity. These 70-ton cars, which are to be used in general service, will be built at A.C.F.'s Milton, Pa., plant.

These cars are representative of the latest in tank-car construction. Fully insulated, they also will be equipped with steam lines to facilitate unloading.

Procon Engaged to Build New Catalytic Units

Procon, Inc., construction subsidiary of Universal Oil Products Co., Chicago, refinery designers and engineers, has been engaged to handle the building of new catalytic cracking and gas-recovery units for Northwestern Refining Co., St. Paul Park, Minn.

The new units are part of an extensive improvement and expansion program to increase Northwestern's crude-processing capacity from 8,000 to 30,000 bbl. per day.

Read Standard Names Surdy

Charles J. Surdy, vice president, Read Standard Corp., in charge of Standardaire Blower Division sales and engineering, has been elected a director. He has been with the company since 1926.

Gustin-Bacon Opens New Houston Office, Warehouse

Gustin - Bacon Manufacturing Co., Kansas City, recently announced the opening of a new sales office and warehouse facility in the major industrial section of Houston. The new warehouse will house the Houston division operations of its oil-field, industrial, insulation, and fire-fighting-equipment business.

Paul O. Craig has been appointed by the company as Houston division manager. H. M. Stone, who has been associated with Gustin - Bacon in Houston for the past 17 years, remains as branch manager.

(Continued on page 169)

New Houston warehouse and sales offices of Gustin-Bacon Manufacturing Co.

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SPUDDERS, BUCYRUS, Wichita, Fort Worth, also rotaries and core drills. Good used equipment, tools, pipe, cable. Everything for well drilling. Fishing tools rented Pressey & Son, Pueblo, Colorado.

WANT TO TRADE: Trailer mounted Rotary, Wilson draw works, 66′ mast, 7¼ x 10 GD Pump. Complete and excellent condition for Rotary suitable for 4000′ drilling or what have you. Box 378, Cherryvale, Kansas.

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This is choice material, neoprene and inner steel coil, and is recommended for immediate and future use. At the above price it will not be available at less than three times our price when our present stock is exhausted. Right now you can get any quantity up to a carload.

A few 6″ with aluminum nipples and flanges at $250.00 each.

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NEW ORLEANS 16, LA.

EQUIPMENT FOR SALE

FOR SALE: Redwood Oil Tanks. One six hundred barrel. One 500 barrel. One three hundred barrel gun barrel. Two hundred and fifty barrels. One one hundred barrel. Call or write P. C. Dressler, McLouth, Kansas.

PIPE FOR SALE: 7,000 ft. of 6⅝ I.D. Casing—13 lb. Good threads and collars. 5,000 ft. 5⅜ Casing, good threads and collars. 7,500 ft. 6 in. O.D. line pipe. 1,000 ft. of 3 in. heavy casing, good collars and threads. 14,000 ft. of 4 lb. heavy and good 2 in. tubing. Allen Gas Corporation, Paola, Kansas.

Gaso Duplex 4½″ x 6″ Power Pumps with Chrysler C-36 Engines, skid mounted, immediate delivery. Also Byron Jackson, Carter Centrifugal Units. Westinghouse 20-25-50 KW Generating Units.

H. H. COFFIELD
Attn.: W. H. ORR
Phones: 132—Rockdale, Texas
AT-3427—Houston, Texas

EQUIPMENT FOR SALE

2318′ Good seamless Pipe 74 Joints, 7″ O.D. 23#, 8 R. Thread, Collars. $3.52 Per ft. Located West Central Texas. Phone WE 6227, Box 1512, Dallas.

7500′ of API Full Hole 4½″ Drill Pipe. Graded by Sonoscope engineers. Approx. OD of joints 5½″. $2.50 per ft. Milford Giffin, Giffin Hotel, Hoisington, Kansas.

USED DIESEL BOATS

4—110′ Ex-Subchasers
1—104′ A.C.R. Boat
1—115′ Steel Tug
1— 45′ Steel Tug
1— 31′ Work Boat
1— 30′ Pusher Tug
1— 75′ C.G.C. Wood Hull

NEW BOATS

1— 45′ . . 1—55′ Tug
1— 42′6″ Tow Boat
1— 30′ Water Taxi
1— 38′ Water Taxi

EQUITABLE EQUIPMENT CO., INC.
410 Camp St., New Orleans, Louisiana

DESIRABLE PIPE AND CASING FOR SALE

CASING:

35,000′ 2⅜″ O.D. 4# Used Lapweld Range 1 11½ V-Thread Tubing.
16,000′ 5½″ O.D. 14# Good Used Lapweld 11½ V-Thread Casing.
14,500′ 7″ O.D. 17# Good Used Lapweld Range 1 10 V-Thread Casing.
2,000′ 8⅝″ O.D. 24# Good Used Lapweld 8 V-Thread Casing.

LINE PIPE:

3,000′ 5″ O.D. x .250″ Wall New Seamless, P.E., Random Lengths.
4,700′ 6″ O.D. x .134″ Wall New Electric Weld, 8.99#, P.E., 20′ Lengths, Tested 807# P.S.I.
10,000′ 8″ O.D. x .134″ Wall 12# New Electric Weld, P.E., 20′ Lengths, Tested 605# P.S.I.
9,140′ 10″ O.D. x .134″ Wall 14.87# New Electric Weld, P.E., 20′ Lengths, Tested 484# P.S.I.
5,000′ 12″ O.D. x .250″ Wall Used Pipe, 40′ Lengths, Two Joints Welded.
34,000′ 20″ O.D. x .281″ Wall 59.00# Used Welded Line Pipe, Excellent Condition.
1,900′ 24″ O.D. x .312″ Wall 79.05# New Electric Weld Pipe, 40′ Lengths.
1,600′ 26″ O.D. x .260/.300″ Wall 75.82# New Electric Weld, Range 1, Short Joints Welded.
1,900′ 26″ O.D. x .281″ Wall 77.5# New Electric Weld, 40′ Lengths.
440′ 26″ O.D. x .500″ Wall 136.17# New Electric Weld, 20′-40′ Lengths.
900′ 30″ O.D. x .344″ Wall 118# New Electric Weld, 40′ Lengths.
2,200′ 30″ O.D. x .500″ Wall 167# New Electric Weld, 40′ Lengths.
5,000′ 36″ O.D. x .250″ Wall 63.5# Used Excellent Grade Riveted Line Pipe (Suitable for low pressure discharge line or culvert pipe).

IMMEDIATE DELIVERY—SUBJECT TO PRIOR SALE

NEW AND USED CASING, TUBING, LINE PIPE & SEAMLESS TUBING

FOR FULL DETAILS, WIRE OR PHONE AT ONCE

A. J. STRUBEL, Broker

4948 Murdoch, St. Louis Mo. Sidney 1781 (Day Phone) HUdson 8152 (Night Phone)

EQUIPMENT FOR SALE

USED rotary and cable tool drilling tools, wire lines, E. A. Kelly, Box 861, Oklahoma City. Phone 5-6407.

PIPE: Casing, line pipe and tubing. Pumping units, gasoline engines, electric motors, and oil field equipment. Tulsa Supply Company, Box 294, Tulsa, Oklahoma.

SPUDDER BARGAINS!
Cardwell KLGMD, Butane, slick, clean, complete with three strings tools, $20,000.00. Cardwell RLBUD, Diesel, less tools, $16,000.00. Both with 55 foot double poles, both late postwar models, both absolutely A-1 every respect. Will finance two-thirds either or both. Mid-East, Box 253, Fairfield, Illinois.

FOR SALE: No. 3-A-6 National Drilling Machine with 56'—10" shear poles Power Young Drilling motor all in excellent condition. Tulsa Ph. 4-2889 or write Box E-471, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: 3716', 121 joints, New 4½" O.D. API Seamless Casing, Grade J-55, 11.60# 8rd, thd. T&C. $1.75 per foot fob yard Great Bend, Kansas. Subject to prior sale. Address 306 Derby Bldg., Wichita, Kansas. Phone 5-4172.

We Offer

PRESSURE VESSELS

FOR SHIPMENT NOW

USED CONDITION
CODE CONSTRUCTED BY
A. O. SMITH CORP.

8—10' ID dia. x 40' tangent to tangent x 3" shell. Heads 3½". Test pressure—900 psi. WP—600 psi. All-weld.

8—10' ID dia. x 40' tangent to tangent x 2½" shell. Heads 3". Test Pressure—750 psi. WP—500 psi. All-weld.

2—8' ID dia. x 40' tangent to tangent x 1½" shell. Heads—1¾". Test pressure 575 psi. WP—380 psi. All-weld.

8—8' ID dia. x 40' tangent to tangent x 2" shell. Heads 2¼". Test Pressure 750 psi. WP—500 psi. All-weld.

All vessels located near Chicago, Illinois, and offered subject to prior sale.

Write—Wire or Phone
Howard Kinslow

Kinslow Power & Equipment, Inc.

817 So. Boulder **Tulsa 14, Okla.**
Phone 5-5914

EQUIPMENT FOR SALE

AS IMPORTERS of Steel we can furnish you with European or Japanese Steel Products of all types. Let us have your inquiries. Hemisphere International Corp., 1404 Hibernia Bank Bldg., New Orleans, La.

FOR SALE: Two 3000 bbl. Butler bolted tanks good condition. Can ship immediately. Wentz Fuel Oil Company, 1012 No. 16th St., Lincoln, Nebraska.

LIGHT PLANTS: New and rebuilt. Witte & Shepherd. Diesel Light Plants, 3 to 15 KW, A. C. 60 Cycles, 110-120 Volts. Single or 3 Phase. Priced to sell. Irick Electric Co., Inc., Box 928, Gallup, New Mexico.

KEYSTONE spudder, trailer mounted, truck and tools. Located Washington County, Oklahoma. Working on seven hundred foot well. Box E-385, The Oil and Gas Journal, Tulsa, Oklahoma.

ROTARY MUD PUMP: 6 X 16 Oilwell, good condition, recently overhauled, subject your inspection. $6500.00. Write Howse Drilling Company, 208 Grant Bldg., Abilene, Texas. Phone 2-3780.

DEEP WELL TURBINE PUMPS: One BJ and One Western, with ICK Waukesha Motors. WANTED good used 4X6 enclosed duplex type water pump. G & H Supply Co., Box 4052, Oklahoma City. Phone 62-7886.

FOR SALE: One super model Wilson single drum servicing unit, 80 hp. Waukesha 4,000' wire, all tubing tools, mounted on GM 4-wheel drive truck. $3500. Phone Rogers Pipe and Supply Co., Tulsa, Okla.

SPECO TOOL COMPANY

List your oilfield equipment with us. For trade or sale.
We buy and sell all types of used oilfield equipment.
Oil Field Maintenance & Repair Machine Shops.

Texas representative—James Geurin
3809-33st. Lubbock, Texas
Phone 38711

Salem, Ill. **Phone 915**
Crossville, Ill. **Phone 841**

BINS

7'x8"x11'6"x17'3" (2).
8'x8'x14' with U bottom (2).
4'x5'x30' (2).

BUCKET ELEVATORS

70'6" centers, 8"x5" buckets.
64'3" centers, 10"x6" buckets.
60' centers, 8"x6" buckets.
50'6" centers, 8"x5" buckets.
44' centers, 10"x6" buckets.
40' centers, 6"x4" buckets.
38' centers, 10"x6" buckets.
36' centers, 10"x6" buckets.
34' centers, 10"x6" buckets.
32' centers, 6"x4" buckets.
30'8" centers, 6"x4" buckets.
29' centers, 6"x4" buckets.
23' centers, 8"x5" buckets.

HEAT & POWER CO., INC.
70 Pine St., Hanover 2-4890, New York 5
Machinery & Equipment Merchants

FOR SALE
VARIABLE SPEED

PIPE LINE MOTORS
USED BUT IN EXCELLENT CONDITION

IMMEDIATE DELIVERY

5—250 HP, 1—300 HP Elliott Base Ventilated, 3540 RPM, 2300 Volt, 3 phase, wound rotor induction motors complete with necessary controls. For details address inquiries to Box E-462, The Oil and Gas Journal, Tulsa, Oklahoma.

EQUIPMENT FOR SALE

FOR SALE: 87 ft. telescoping rotary drilling mast complete with steel sub base. Terms. Melton Supply Company, Seminole, Oklahoma.

1950 SPARTAN 33½ ft. Royal Mansion, with ¾ ton Philco Airconditioner. Never been used on road. In first-class condition. Hylander Cafe, 2701½ Drexel, Houston, Texas.

SLIGHTLY USED: 1—Model T-380 7½"-X 12" Clark Ideco Triplex Slush Pump, 380 H.P., 800# P.S.I., 805 GPM at 65 S.P.M., Fluid End 3500# WP Suction 1500# WP, Wt. 30500#. Excellent Condition. Price F.O.B. Odessa, Texas, $8500.00. H. A. McCarthy, 310 Thompson Bldg., Tulsa, Okla.

FOR SALE: 36-L Bucyrus-Erie in excellent condition with or without tools. Casing as follows: 700'—12" I.D., 600'—10" I.D., 500'—8" I.D., 1800'—6⅝" I.D. Or would be interested in drilling contract—would take small interest. Send particulars to: Herman Sill, R.F.D. #3, Box 63, Joplin, Missouri.

PIPE

All sizes; line pipe and casing, tanks, and Oilfield supplies. Edco Pipe & Supply Co., Phone 98434, Tulsa, Oklahoma.

WANT EQUIPMENT: Did you find the equipment you wish to purchase in this column? If not, use an "Equipment Wanted" classified advertisement to find it. It is available somewhere and Journal classified advertisements will find it. See box heading for classified rates, or write The Oil and Gas Journal.

EQUIPMENT WANTED

WANTED: Franks-4500 or 5000 Portable rig. Skid-mounted or trailer-mounted. With drilling accessories and with or without mud pump and drill pipe. Contact P. O. Box 1022, Del Rio, Texas.

WANTED: Lee C. Moore 87' mast and sub base complete. Have 66' trailer mounted mast for sale or trade. Box 378, Cherryvale, Kansas.

WE BUY well drilling equipment, machines, cable tools, pipe, etc. Turn your surplus equipment into cash. Pressey & Son, Pueblo, Colorado.

2⅞" I. F. drill pipe Range 1 and 2 with tool joints. 4¾" or 5" drill collars Range 2. 4½" light weight casing elevators. Contact P. O. Box 730, Bartlesville, Okla.

WANTED: Triplex Type Pumps, minimum 500 barrels per day capacity at 1,000 PSI and 0 to 10 PSI suction and up. 1" Regular Black Line Pipe; 1" long collar line pipe and 1¼" upset tubing. Must be in good condition. Lynch Oil Company, P. O. Box 814, Evansville, Indiana.

EQUIPMENT NOT IN USE: Did you find a buyer in this column for the equipment you have for sale. Someone wants it and an "Equipment For Sale" classified advertisement in the Journal will find a buyer. See box heading for classified rates or write The Oil and Gas Journal.

WANTED
TO TRADE 50,000'

4" New Standard Black 10.79# Electric Weld Pipe, Beveled Ends

FOR

5", 6", 8", 10" or 12" New Standard Blk., Welded or Seamless Pipe, P.E. or T & C, on Mill Price Basis.

Phone or Wire Collect

CENTRALIA PIPE & SUPPLY CO.
CENTRALIA, ILL.
Frank Corgiat **Phone No. 6771**

WANTED—GOOD USED DRILLING EQUIPMENT

1—Triple Lee C. Moore, or similar, drilling mast with 7 foot substructure
1—150 ton BJ, or similar, hook
1—150 ton swivel
1—4 sheave 150 ton traveling block grooved for 1⅛" line
1—4¼" x 40' square Kelly
1—13⅝" Shaffer type 39 or 40 double B.O.P.
1—Link belt, or similar, shale shaker

GEHRING EQUIPMENT COMPANY
P.O. Box 2290 **Casper, Wyoming**

HELP WANTED

RESEARCH Engineer — 26-40 — B.S., and preferably an advanced degree in petroleum or mechanical engineering. Must be widely experienced in well completion practices. Will be responsible for research program in well completion practices and well mechanics. Salary open. Location — Ponca City, Oklahoma. State age, experience, education, and salary desired in opening letter. Write direct to Personnel Records Division, Continental Oil Company, Ponca City, Oklahoma.

KEY Seismograph Personnel Needed by Established and Expanding Seismograph Company. Box E-264, The Oil and Gas Journal, Tulsa, Oklahoma

EXPANDING program provides excellent opportunity for a few experienced Seismic Party Chiefs for foreign and Canadian assignments. Applicants should have not less than three years' experience in capacity of Party Chief, be proficient in interpretation, and have proven ability to administer crew. Liberal compensation based upon competence. United Geophysical Company, Inc., Bin M, Pasadena 15, California.

WANTED—TRAVELING AUDITOR
Excellent opportunity for auditor who is free to travel. Work requires auditing of oil company records in the United States and Canada. Applicant should be familiar with refinery procedures. Yield clerk and typing experience helpful. Must have automobile. Box E-469, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Experienced refinery Superintendent for 4000 bbl. plant. Send experience record, salary expected and other details. Box E-459, The Oil and Gas Journal, Tulsa, Oklahoma.

HELP WANTED

WANTED BY SEISMOGRAPH COMPANY
IMMEDIATE EMPLOYMENT
ATTRACTIVE SALARIES
Openings for Party Chief capable of interpretation of seismic data, Computers, Surveyors, Observers, and Shooters. Box E-449, The Oil and Gas Journal, Tulsa, Oklahoma.

RESEARCH Metallurgist—26-40—B.S., and preferably advanced degree in metallurgy or metallurgical engineering. Should have experience with all types of laboratory apparatus for metallurgical study and experience in selecting materials for all types of services. Corrosion studies, materials selection, and anlysis of failures will constitute the bulk of the work. Salary open. Location—Ponca City, Oklahoma. State age, experience, education, and salary desired in opening letter. Write direct to Personnel Records Division, Continental Oil Company, Ponca City, Oklahoma.

INTERNAL Auditor for integrated oil company in Mid-Continent Area. Excellent future. Age limit to 45. Public accounting and oil experience desired. Our employes know of this ad. Box E-473, The Oil and Gas Journal, Tulsa, Oklahoma.

RESEARCH Group Leader and Research Engineer — 26-40 — B.S., and preferably a Ph.D. in physical chemistry, physics, petroleum engineering, or chemical engineering. Should have experience in reservoir engineering, reservoir mechanics research, or fluid flow research. Will be responsible for research program in multiphase flow and other aspects of reservoir mechanics. Salary open. Location—Ponca City, Oklahoma. State age, experience, education, and salary desired in opening letter. Write direct to Personnel Records Division, Continental Oil Company, Ponca City, Oklahoma.

HELP WANTED

GRADUATE Petroleum Engineer one to three years experience in field and office duties for expanding independent producing company. Successful applicant will headquarter in Houston, but must be free to travel. Excellent opportunity for hard worker. In answer give age, education, experience in detail, marital and draft status and starting salary expected. Box E-461, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Cable tool drillers with big hole experience, who are sober and reliable. We offer permanent jobs with good pay. Layne-Minnesota Co., 3140 Snelling Ave., Minneapolis, Minn. Telephone—Parker 6668.

ENGINEERS, Executives, Technical Men Salaried positions—$3600 to $30,000. This confidential service for outstanding men who desire a change of connection. Will develop and conduct preliminary negotiations without risk to present position. Send name and address for details. Tomsett Associates, 334 Frick Bldg., Pittsburgh 19, Pa.

GEOLOGISTS with masters degrees having 3 years or under experience. Petroleum Engineers with 1½ or more years well work experience. Experimental geophysicists under 40. Experienced landmen with law degrees under 35. Topographical draftsman. Excellent employer. Good salaries. Experienced oilwell supply storemen, store managers and salesmen. No fees. Tom Robinson, owner Oil Industry Employment Service, 405 Tuloma Bldg., Tulsa, Okla. 4-5974.

THE POSITION YOU WANT: Oil industry companies are looking for men to fill every conceivable kind of position. If you didn't find the position in this column that you are looking for, use a "Situation Wanted" classified advertisement to state your qualifications. Some company is probably looking for your ability. See box heading for classified rates or write The Oil and Gas Journal.

SITUATIONS WANTED

FORMER Independent Oil Operator ten years, with legal education, plus eight years Wall Street experience, desires connection raise funds exploratory well drilling from excess profits taxpayers. Box E-396, The Oil and Gas Journal, Tulsa, Oklahoma.

ENGINEER AVAILABLE
BSChE 1949 (cum laude), EE minor, 3 years USNR, age 26, personable, presently employed as process engineer, one year polymer development, one year petroleum process engineering, has inquiring and original type of mentality, proven creative ability. Has originated and developed to plant scale valuable petroleum process yielding over $300,000 per month—payout time of half year. Now developing another original and patentable process for same firm. Present salary does not reflect ability or results. Desire change due to lack of financial incentive. Desire foreign position (tax benefits) or opportunity for minor share of creative results. Wide field of interests. Available for interview late December. Box E-474, The Oil and Gas Journal, Tulsa, Okla.

LEADING rust preventive and specialty lubricant formulator, desires position of chemical director with independent oil company. Age 45. Box E-475, The Oil and Gas Journal, Tulsa, Oklahoma.

STATISTICIAN—6 years utility rate work, cost estimates, FPC cases, capacity allocations, economic studies. 2 years design calculations. 1 year steam diesel operation. BS Mech. Eng. Age 32. Box E-485, The Oil and Gas Journal, Tulsa, Oklahoma.

CIVIL ENGINEER, 3½ years experience refinery maintenance and construction with major oil company. Will consider foreign and domestic service. Box 1001, Sunburst, Montana.

OIL SECRETARY: Thoroughly experienced in all executive phases of oil production, exploration, land and accounting. Presently employed. Desires connection with small independent in Dallas. Can furnish excellent background and references upon request. Single, 35 years old. Please reply to Box E-480, The Oil and Gas Journal, Tulsa, Oklahoma.

ACCOUNTANT: Recoverable Crude Oil and Gas Analyst. Budgets, Forecasts, Evaluations, Taxes. Excellent Accounting Background. Box E-472, The Oil and Gas Journal, Tulsa, Oklahoma.

ENGINEERS

CHEMICAL
ELECTRICAL
STRUCTURAL
PIPING-DESIGN

Work in Southern California

Positions are open for men with experience in the engineering and design of oil-refineries or chemical-plants. Our expanding workload presents opportunities for advancement.

Please send a detailed summary of your education, experience, and personal history to our Personnel Department. Also include a recent photo of yourself. All replies will be kept confidential.

C F BRAUN & CO

Engineers · Fabricators · Constructors · Consultants

1000 South Fremont Avenue, Alhambra, California

SITUATIONS WANTED

PETROLEUM ENGINEER: 2 years experience in drilling, production, and workover operations; 2 years experience in reservoir engineering and evaluation. Presently employed. Desires to become affiliated with independent operator. Box E-451, The Oil and Gas Journal, Tulsa, Oklahoma.

TWENTY YEARS' experience refinery superintendent and manager. Desire connection with independent refinery. Box E-456, The Oil and Gas Journal, Tulsa, Oklahoma.

GRADUATE Electrical Engineer—Eleven (11) years experience with major electrical manufacturer applying electrical and mechanical equipment, pipelines, refineries and production. Previous distribution and maintenance. Basic knowledge micro-wave and geophysics. Private pilot. Age 37. Family. Desire connection with oil industry administrative engineering capacity. Box E-467, The Oil and Gas Journal, Tulsa, Oklahoma.

ATTENTION: Well established oil well drilling contractor desires to manage and supervise: Individuals', groups', small or medium-sized oil companies' drilling, production and operating problems in Central and Western Texas, and New Mexico. Personal interview by appointment is desired. Makin Drilling Company, Box No 131, Ph. No. 131, Hobbs, New Mexico.

GRADUATE Petroleum & Mechanical Engineer desires domestic or foreign supervisory position in refining maintenance, inspection, Mechanical or operating fields. Age 32, married with children, seven years domestic and Foreign experience refining operation, maintenance, equipment and welding inspection, corrosion engineering, and cathodic protection designing. Box E-433, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM Engineering graduate of Texas A. & M. with seven years field, engineering, and management experience in drilling and production on the Gulf Coast. Box E-478, The Oil and Gas Journal, Tulsa, Oklahoma.

SURVEYOR, with 10 years experience in pipeline construction and location, general oil field surveying and land surveys both foreign and domestic with complete knowledge all types surveying instruments, desires position either domestic or foreign. Knows Spanish. Box E-476, The Oil and Gas Journal, Tulsa, Oklahoma.

OIL SCOUT and Land man desires change. Knows Rocky Mountain Region in general and exceptionally well informed on Wyoming in particular. Box E-477, The Oil and Gas Journal, Tulsa, Oklahoma.

THE RIGHT MAN: Can you fill the position you have open from the qualifications listed in this column. Men are always looking for an opportunity to improve themselves. Use a "Help Wanted" Journal classified advertisement to find the men you need. See box heading for classified rates or write The Oil and Gas Journal.

CHIEF CHEMIST

Eighteen years successful experience as chief chemist, operations supervisor and technical advisor with one major and one independent refiner in midwest, south and east. Wide contacts, excellent references. Box E-483, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE—MAPS

NORTH DAKOTA and South Dakota Base Maps—County outline, Township and Range, location of wells and Operators name with total depths. Oil and Gas Fields. 1" = 8 miles. Price $5.00 each. County Maps: Fee ownership and lease with expiration dates. Scale 1" = 4,000 ft. Northwest Mapping Co., 117½ Fourth St., Bismarck, North Dakota.

NEW Williston Basin Map—Montana, Wyoming, North and South Dakota, North Nebraska, Western Iowa and Minnesota—15 miles to 1 inch—showing all townships and ranges—all wildcat activity in each state—size 42" x 48"—price, paper $10.00, cloth $17.50—address all orders and make checks payable to D. A. Austin Company, Commercial Standard Building, Fort Worth 2, Texas.

ROYALTIES

LANDOWNERS royalty under major company lease near Sinclair Oil and Gas Co. well now drilling. For sale by owner, 620 Luhrs Bldg., Phoenix, Arizona.

MONTANA ROYALTIES

Millions of acres now leased by world's major companies, with huge drilling play in prospect. For booklet describing Montana geology and oil development, write Landowners Royalty Company, Box 1325 Great Falls, Montana.

GET TOGETHER: Both Capital and Royalties are available. If the investment proposition you want isn't listed in this column use a Journal classified advertisement to find it. See box heading for classified rates or write The Oil and Gas Journal.

LEASE AND DRILLING BLOCKS

ARIZONA five year term Oil and Gas leases with good geology. Several wells either drilling or planned in the area. Sunland Oil Corporation, Luhrs Bldg., Phoenix, Arizona.

OPERATOR with portable drilling rig, trucks, and other lease equipment, desires connections with financed parties, contemplating water flooding. Prefer shallow area Oklahoma, and Kansas; also have several leases suitable for flooding. Box E-484, The Oil and Gas Journal, Tulsa, Oklahoma.

READ Tulsa Oil and Gas Journal Oct. 18, pages 72 & 181, Imperial County, California, 5 year leases (rental paid 3 yrs.) on Geological-Geophysical structures. $200 per 40 acres. Write Main P.O. Box 30, Los Angeles.

INTERESTED in drilling several wells not over 4,000' in North Texas by December 15th. Give complete description and full details, Box 4343, Dallas, Texas.

WILL pay cash instantly for leases (large blocks), royalties, mineral deeds, production. Write fully—P. O. Box 2183, Denver, Colorado.

IF INTERESTED in reasonably priced oil and gas leases in Shelby County, Texas, surrounded by major company activity, write me for detailed information. C. A. Parker, Office Polley Hotel, Center, Texas.

2200 ACRES in Tensas Parish. Good oil prospects, fine soil, pasture and timber. Priced with or without minerals. Mrs. Arno Halbfass, Shreveport, Louisiana.

WILL checkerboard 10,000 acres for test well to 4,000 feet in Southwest New Mexico. Excellent Geology. Large Oil Company has leased all remaining acreage, a real hot spot of the future. Box E-464, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: Oil and Gas Leases adjoining producing leases, also wildcat leases, drilling propositions and small producing properties; all in shallow territory. W. P. Harley, Bowling Green, Ky.

WE will purchase one or several oil wells with sand, paraffin, or similar production problems. Le Baron, 430 South Western, Los Angeles. Dunkirk 8-7800.

FOR SALE: New Mexico Oil and Gas Leases in Southern San Juan-Zuni Basin Area, 160 to 1280 acres, T12N, R13W, Valencia County. Also 40 acres, 19S, 27E, Eddy County, 4 miles from production. Box E-479, The Oil and Gas Journal, Tulsa, Oklahoma.

CAPITAL immediately available for geologically attractive Drilling deals and oil producing properties. Send full particulars. Box E-434, The Oil and Gas Journal, Tulsa, Oklahoma.

500-ACRE BLOCK: Carter County, Oklahoma, ready for shallow wildcat test this year. Box E-482, The Oil and Gas Journal, Tulsa, Oklahoma.

LEASES ROYALTIES
Producing and Nonproducing
Bought and Sold—Any Area
Inquiries Invited

B. D. BUCKLEY
6635 Delmar Ave., St. Louis 5, Mo.

LEASE AND DRILLING BLOCKS

WE want a good drilling block, some production with proven or semiproven acreage to be drilled preferred, from owner principals. Must be good properties. Texas properties will be given first consideration. Box E-460, The Oil and Gas Journal, Tulsa, Okla.

LOOKING FOR A LEASE? There will be over 40,000 wells drilled this year. If you are looking for a lease, drilling block, or drilling deal and haven't found it in this column, or if you have a lease or drilling block you want drilled, a Journal classified advertisement can find an interested party. See box heading for classified rates, or write The Oil and Gas Journal.

REAL ESTATE

SPACE IS NEEDED: A Journal display classified advertisement is the quickest way to rent or sell your real estate. In the present period of expansion oil industry firms urgently need the space you have available. If it isn't listed here, you may also find it by stating your needs in these pages. For classified rates see box heading or write The Oil and Gas Journal.

LEASE SERVICE

RECORD TAKE-OFF, available. Listing all Oil leases and assignments as recorded in Grant County, at Carson, North Dakota. Giving complete information. Also monthly continuations made. Write P. O. Box 344, Carson, North Dakota.

GEOPHYSICAL SERVICE

GEOLOGY of the Magic Circle, Daniel E. Willard, Kansas, Nebraska, Iowa, Missouri, Oklahoma; send check $5.00, Magic Circle Educational Foundation, Yates Center, Kansas.

LEGAL BLANKS

BURKHART LEGAL BLANKS since 1908. Oil-Gas (all states), Business, Real Estate, Legal Forms, Leases, Revised With Government Regulations, Commercial Printing. Catalog and Samples on request. Burkhart Printing & Stationary Company, 115 South Cincinnati, Tulsa, Oklahoma.

BUSINESS OPPORTUNITIES

WINTER in southern Calif. sunshine and join renumerative leasing and geophysical achievements. $3,000 required. 126 Lester Dr., Orange, Calif.

OIL PRODUCERS

Do you have (1) Producing properties? (2) A net operating loss for tax purposes? If so, see us. We will convert future producing income to cash and current income. Even corporations do not get benefit of carry back to extent of per cent depletion. Laurel Royalty Company, Box 198, Laurel, Mississippi.

COMPLETE Record keeping, Machinery and equipment inventories. Payrolls, reports within 500 miles of Tulsa office. Replies confidential. Box E-481, The Oil and Gas Journal, Tulsa, Oklahoma.

THREE Drive In Theaters, $350,000.00. Terms. Sound Investment. Will Stand very Closest investigation. Southwest Texas. Reason for Selling, old Roughneck retiring. Made his. Box E-468, The Oil and Gas Journal, Tulsa, Oklahoma.

WANT
N. Y. EXPORT REPRESENTATION?

Long established and well known oil well equipment manufacturer who has maintained N. Y. export office and sales personnel for many years, is now in a position to handle additional representation in New York for high quality manufacturers of oil equipment items. If you're looking for increased export business, write for further information. All replies held in strict confidence.

Box E-359, The Oil and Gas Journal, Tulsa, Oklahoma

EQUIPMENT MEN

(Continued from page 164)

Orbit Valve Announces Personnel Changes

Several transfers in the sales organization of Orbit Valve Co., Tulsa, who manufacture production and L. P. gas valves, have been announced by J. Dock Mumford, sales manager.

Jack Judd of the Houston branch has been transferred to the Midland, Tex., office, and L. E. (Ed) Wallace, formerly headquartered at Corpus Christi, Tex., has been transferred to the Houston branch.

Ralph H. Soape will supervise the Corpus Christi territory. Before joining Orbit, Soape had been associated with the Republic Supply in Southwest Texas for 6 years.

Plant Engineering Service Offered by New Firm

A new firm, Mechanical Design, Inc., has been organized with offices in the Wright Building, Tulsa. Operations were started in November. The new firm offers a complete mechanical engineering and design service to the petroleum industry and will specialize in refinery and gasoline-plant design.

Officers of the company are: J. R. Lawrence, president; Herbert E. Dyer, vice president and manager; Maloy Stevenson, secretary; and Huff D. Peters, treasurer.

McIntosh Joins Grant As International Supervisor

Appointment of Lawrence R. McIntosh as vice president in charge of the international division of Grant Advertising, Inc., has been announced by Will C. Grant, president.

McIntosh will supervise international accounts serviced through 20 Grant offices in South and Central America, Europe and India.

Before joining Grant, McIntosh was merchandising director of Pacific National Advertising Agency of Seattle, Portland, and Spokane.

Anderson Returns To B&W Tube Co.

James S. Anderson, who has been on leave from The Babcock & Wilcox Tube Co., has returned to his duties as assistant general sales manager. Anderson has been in Washington serving as chief of the tubing section of the iron and steel division of the industries operations bureau of the National Production Authority since April 1951.

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"Your want ad for foreign leases in The Oil and Gas Journal sure got results."

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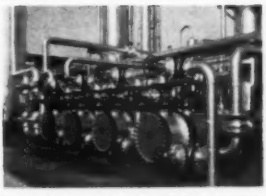
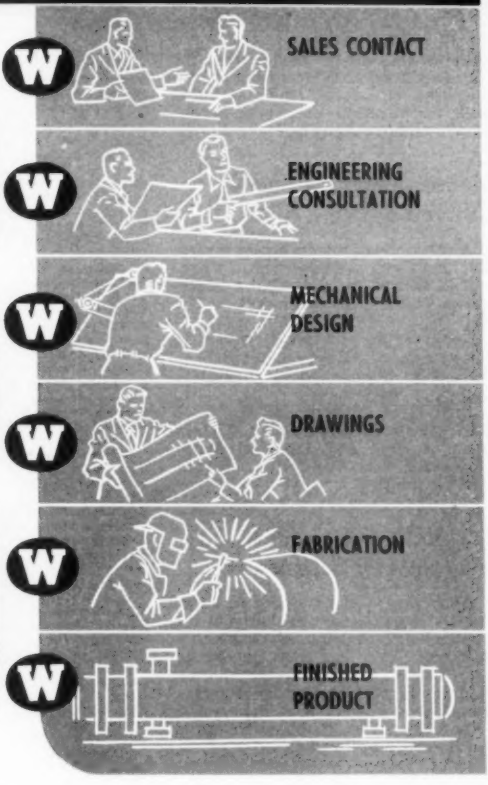
THE BRAND of Heat Transfer Quality

PIPELINE

PETROCHEMICAL



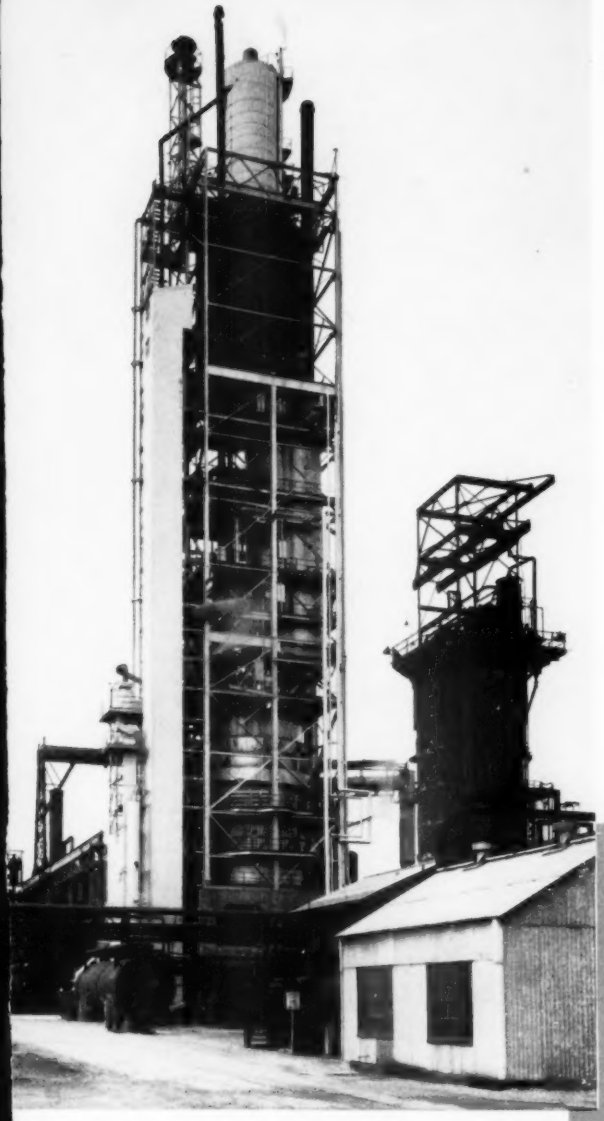
REFINING & NATURAL GASOLINE



The Western Supply Company is daily filling the heat transfer needs in all phases of the petroleum industry. From the planning to the finished product stage Western men and machines are geared to serve YOU with all your difficult heat transfer problems. Shell and Tube Exchangers; Telescopic Exchangers; Atmospheric Sections; Reboilers—remember the WESTERN brand for dependable engineering consultation, rigid adherence to fabrication specifications and details.

WESTERN
HEAT EXCHANGERS
Manufactured by
WESTERN SUPPLY COMPANY
P.O. BOX 1888 TULSA, OKLAHOMA

SAN FRANCISCO REPRESENTATIVE, TRIDENT ENGINEERING COMPANY
LOS ANGELES REPRESENTATIVE, JACKSON ENGINEERING COMPANY



The 14-ft. diam. by 35-ft. separator surge tank and the 27-ft. 6¾-in. diam. by 45-ft. 5⅝-in. single zone kiln for this T.C.C. unit at the Socony Vacuum Oil Company, Inc., Atlas Works in Buffalo, N. Y., were fabricated by the Greenville plant of Chicago Bridge & Iron Company.

HORTON

SURGE TANK and KILN for T.C.C. UNIT

THE separator surge tank and the single zone kiln which are integral parts of the thermal catalytic cracking unit in the view at the left were fabricated at one of our plants. Bechtel Corporation was the general contractor on the installation, located at the Socony Vacuum Oil Company's Atlas Works in Buffalo, N. Y.

The top of the separator surge tank—shown at the top of the T.C.C. unit—is 250 ft. above the ground. It is designed to reduce the velocity of the air-catalyst mixture flowing from the air lift tube to the reactor and to allow these components to separate.

The single zone kiln shown at the bottom of the T.C.C. unit burns the carbonaceous residue off the catalyst as it comes from the cracking operation.

The two vessels which we furnished for the Socony Vacuum T.C.C. unit at Buffalo are typical Horton steel plate structures for the petroleum industry. We also build absorber towers, propanizers, scrubbers, or whatever processing units your refinery requires.

Write our nearest office for information. There is no obligation on your part.

HORTON VAPOR-SAVING UNITS

Hortonspheres for efficient pressure storage of highly volatile hydrocarbons.

Hortonspheroids and Hemispheroids to prevent excessive evaporation from less volatile hydrocarbons.

Hortondome Roofs to prevent evaporation losses from standing storage.

Horton Floating Roofs to stop evaporation, cut down corrosion and reduce fire hazard on working storage tanks.

CHICAGO BRIDGE & IRON COMPANY

Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY and GREENVILLE, PENNSYLVANIA

Atlanta, 3.....2154 Healey Bldg.
Birmingham, 1.....1536 North 50th St.
Boston, 10.....1025—201 Devonshire St.
Chicago, 4.....2128 McCormick Bldg.
Cleveland, 15.....2204 Guildhall Bldg.
Detroit, 26.....1514 Lafayette Bldg.
Houston, 2.....2119 National Standard Bldg.
Los Angeles, 17.....1523 General Petroleum Bldg.
New York, 6.....3347—165 Broadway Bldg.
Philadelphia, 3.....1615—1700 Walnut Street Bldg.
Salt Lake City, 4.....525 West 17th South St.
San Francisco, 4.....1554—200 Bush St.
Seattle, 1.....1325 Henry Bldg.
Tulsa, 3.....1606 Hunt Bldg.
Washington 6, D. C.....1139 Cafritz Bldg.

REPRESENTATIVES AND LICENSEES

Horton Steel Works, Limited, Fort Erie, Ontario, Canada
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Constructions Metalliques de Provence, Arles-sur-Rhone, France
Chicago Bridge & Iron Company, Ltd., Apartado 1348, Caracas, Venezuela
Comprimo N.V., Amsterdam—O, Netherlands
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Whessoe, Limited, Darlington, England
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Hughes Bit "Warehouses" Will Travel 10 Million Miles This Year

The important thing about this record mileage is the service it represents—

—having the right rock bits on your rig at the right time!

There are approximately 200 Hughes mobile "warehouses" serving over 2700 active drilling rigs in the United States and Canada. They are constantly on the move from Hughes' 150 strategically located stocking points to the drilling rigs.

Each trip to each rig is planned so the right bits will be available on the rig floor as needed.

This is possible because Hughes field service representatives are intimately familiar with drilling conditions and bit requirements of their respective areas.

HUGHES *TRI-CONE*® ROCK BITS